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EMERGENCY MASS FEEDING
instructor course

UNIVERSITY OF LOUISVILLE
OCT 5 3

JOINTLY DEVELOPED AND SPONSORED BY

**THE DEPARTMENT OF DEFENSE AND THE
FEDERAL CIVIL DEFENSE ADMINISTRATION**

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IMPLEMENTATION GUIDE

EMERGENCY MASS FEEDING INSTRUCTION—CIVIL DEFENSE REGIONS

I. General.

The attached lesson plans, teaching notes and diagrams were developed for use in Civil Defense Regions as a guide for one-time training programs in Emergency Mass Feeding under disaster conditions. It is anticipated that most of the personnel attending this instruction will have had previous experience and/or training in feeding activities. The objective of the regional training program is to orient key personnel in subjects related to disaster feeding. It is planned that civilian personnel attending the regional programs will later be concerned with presenting similar training to organizations and/or groups of personnel participating in Civil Defense Activities.

II. Training Supplies and Equipment.

It will be noted that the bulk of equipment to be utilized in the training program will be improvised locally. Non-improvised training equipment is readily available at most Army Installations. Charts, visual transparencies, Quartermaster school texts and additional copies of lesson plans may be obtained by letter request to the Commanding General, Quartermaster Training Command, Fort Lee, Virginia, Attention: Quartermaster Technical Training Service. Requests should be based on Department of the Army approved training programs to be conducted on a one-time basis in each Civil Defense Region. Food utilized in the conduct of training should be issued for and utilized as rations. The amount of food prepared will be regulated by the number of personnel expected to be present for meals.

III. Conduct of Training.

1. It is planned that approximately thirty (30) personnel will attend each program in a "trainee" status. Experience indicates that 4-6 qualified instructor personnel will be required to present the course of instruction. It is suggested that instructors be selected who have had extensive experience in teaching Field Mess Operations.

2. The training program is based upon three (3) eight (8) hour training days. Part of this time will necessarily be devoted to appropriate orientation of "Trainees" by Military and Regional Civil Defense representatives. Local detailed schedules will be prepared in coordination with appropriate Civil Defense Region officials. Outlined below is a training program schedule which may serve as a guide in developing local detailed schedules:

FIRST DAY

Subject	Time
Orientation to the Training Program	1 Hour
Emergency Water Purification and Waste Disposal	2 hours
Prevention of Food Contamination and Food Poisoning	35 minutes
Mess Layout for Mass Feeding	35 minutes
Foods to Serve	15 minutes
Field Expedients	3 hours
Water Purification (Practical Exercise)	1 hour

SECOND DAY

Subject	Time
Field Expedients (Group Performance)	4 hours
Meal Preparation (Group Performance)	3 hours
Review of Previous Instruction	1 hour

THIRD DAY

Subject	Time
Practical Exercises a. Safety b. Fire Building c. Sanitation d. Improvised Lighting e. Fire Building f. Improvised Measuring Instruments (Cans, Ladels, etc.)	5 hours
Conference of Participants in the Training Program	2 hours

ACKNOWLEDGMENT

Representatives of more than 20 national organizations and government agencies joined in pilot testing the training described in this manual. This testing took place at the U. S. Army Quartermaster School, Fort Lee, Va., March 4-6, 1953. The organizations participating were:

American Dietetic Association
American Home Economics Association
American Hotel Association
American Legion Auxiliary
American National Red Cross, Nutrition Service
American National Red Cross, Service Groups
American School Food Service Association
American Women's Voluntary Services, Inc.
Boy Scouts of America
Camp Fire Girls, Inc.
Girl Scouts of America
National Conference of Catholic Charities
National Restaurant Association
Quartermaster Association
Salvation Army
Seventh Day Adventist
U. S. Department of Agriculture, School Lunch Division
Royal Canadian Army
U. S. Air Force
Office of the Secretary of Defense
Office of the Quartermaster General
Quartermaster Training Command
Federal Civil Defense Administration

JOINT ARMY-FCDA TRAINING PROGRAM ON IMPROVISATION IN EMERGENCY FEEDING

INTRODUCTION TO COURSE OF INSTRUCTION

Feeding Problems

In any general natural or man-made disaster—whether it be fire, flood, hurricane, tornado, earthquake or atomic, thermo-nuclear, or saturation bombing—certain emergency conditions will generally prevail.

Wholesale destruction of dwellings, stores, or warehouses by enemy attack will leave thousands of people not only homeless, but without sources of food and feeding facilities. It is essential that provision be made for feeding facilities to be placed in operation immediately after attack. The program must be planned and operated to take care of hungry people wherever they may be. The fundamental importance of any such emergency feeding program automatically gives its organization and development a high priority in civil defense planning.

The content of this course was determined only after considerable discussion between the Federal Civil Defense Administration and the Quartermaster Corps of the Department of the Army. It has also had the benefit of the criticisms, suggestions, and recommendations of the representatives of the organizations and agencies who participated in the pilot program.

The course content includes lessons on sanitation and water purification. In a civil defense emergency, emergency feeding will look to the engineering and health services to provide safe water for cooking and drinking purposes, and to provide adequate facilities for disposal of wastes. It will also look to the health services for assistance on all other matters relating to sanitation. The engineering and health services will, in turn, depend upon the existing water works and sewerage utilities organizations to assume leadership in necessary repair or reconstruction work and the existing public health organizations to assure quality of the water and adequacy of sanitary facilities. It is expected that these services will be properly organized to render effective support to the emergency feeding program. However, it may be necessary for an interim period after attack to feed people without the support of the civil defense engineering and health services. It is for this reason that the course content of this training program includes lessons on sanitation, water purification, and similar subjects. The importance of feeding people is so vital to civil defense that emergency feeding personnel must be trained to operate even under the most adverse conditions.

For purposes of this instruction, certain assumptions are made. These include:

a. That the major portion of public utilities, including electricity, gas, transportation and fuel, will be destroyed.

b. That homes, restaurants, cafeterias, food equipment, and storage facilities will be unusable.

c. That the sewage system has been destroyed.

d. That some food supplies, unaffected by the damage, are available.

e. That water is available and may be used if purified.

f. That salvage materials will be available.

g. That responsibility for feeding will rest upon civilian agencies.

The problem, then, is to establish mass feeding facilities utilizing field expedients, including cooking and eating utensils and waste disposal systems in lieu of normal food service equipment. For full effectiveness, emergency feeding must start immediately after attack.

Major consideration must be given to the selection of a site for such operations. Certain fundamentals must be considered in the selection of a kitchen and eating site in order to attain maximum efficiency. These will be explained in detail in the instruction.

Simplicity must be the keyword in an operation dependent solely on expedients for the preparation and serving of food to large groups of people.

The expedients developed for demonstration can be made from material normally available. These facilities and utensils are of a type that can be made in the shortest possible time with a minimum of tools.

Groups of people with little or no mechanical ability can be instructed in the rudiments of this improvisation without difficulty.

The material covered is considered to be the minimum essential information necessary to meet the requirements of a disaster situation. Particular attention is called to the subjects of water purification, personal hygiene, sanitation, and food poisoning, as the rules pertaining to these are the ones most susceptible to violation.

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Appendix Improvised equipment for emergency mass **feeding**

LESSON PLAN	PAGE 1 OF 7 PAGES

COURSE Disaster Feeding	SUB-COURSE	
UNIT OF INSTRUCTION Emergency Water Purification and Waste Disposal	Schedule No.	No. of Hours 2

SCOPE

Importance of water supply; need for advance planning to avert epidemics; water discipline rules; water sources; precautions for use of surface water; equipment needed; improvised storage and safeguarding of water; methods and procedures of emergency disinfection; testing for residual chlorine; sanitary disposal of solid, liquid, and human wastes, including improvised facilities.

OBJECTIVES

To have the students attain:

1. An appreciation of the importance of advance planning, water discipline, sources, precautions for use of surface water, equipment needed for disinfection, transportation, and storage of water.
2. A working knowledge of emergency water disinfection.
3. A working knowledge of testing for residual chlorine.
4. An understanding of proper waste disposal and improvising the necessary facilities to accomplish the sanitary disposal of waste matter.

REFERENCES

FM 21-10, Military Sanitation July 1945
TM 5-295, Military Water Supply and Purification, August 1945
SR 41-90-1

STUDY ASSIGNMENT

None

TEACHING AIDS

VC slides, actual models of:

Lyster bag and water purification and testing kit; samples of bleach.

QMTC 29

5 min L
(All references listed on front page)

I. INTRODUCTION

A. Motivation

1. Are we ready to act promptly and with efficiency preserving and maintaining a supply of water in the event of severe damage to our public water systems? Do we have our civil defense personnel equipped with complete charts on their respective water systems showing key mains and the control valves? Have we thoroughly indoctrinated the public as to their responsibility and courses of action that will materially aid in preventing the sudden spread of epidemic diseases? These are questions that may help us evaluate our present position and thereby indicate the actual route we should follow in our planning to minimize the overall effect of a serious disaster in our metropolitan and industrial areas.

2. During this period we will point out some of the pitfalls of disaster operations and how to avoid unnecessary conditions by advance planning. Prompt and efficient organization of procurement, purification and storage of water, and sanitary waste disposal as pertains to the operation of an emergency feeding station or outlet will be discussed in detail.

B. Objectives of this unit of instruction are to have the student attain:

1. An appreciation of the importance of advance planning, water discipline, sources, precautions for use of surface water equipment needed for disinfection, transportation and storage of water.

2. A working knowledge of emergency water disinfection.

3. A working knowledge of testing for residual chlorine.

4. An understanding of proper waste disposal and the improving of the necessary facilities to accomplish sanitary waste disposal.

10 min
L, C

II. PRESENTATION

A. Water Purification—General

1. Disasters have caused severe destruction.

a. Survivors need shelter, food and water.

b. Survivors must be warned that all water is unsafe and may cause epidemics of water borne diseases.

c. Underground damage may allow undetected contamination of public water systems.

Ref:
TM 5-295
par 9

2. Water borne diseases.

a. Typhoid fever, paratyphoid fever, bacillary dysentery, amoebic dysentery, cholera, and schistosomiasis are diseases caused by impure water.

b. These diseases can be controlled by disinfection of all water for cooking and drinking.

c. Boil all water for human consumption as an initial precaution.

LESSON PLAN
(CONTINUATION SHEET)

PAGE 3 OF 7 PAGES

CODE NUMBER

Ref:
TM 5-295
par 3a

3. Rules for water discipline.
    - a. Drink only safe or approved water.
    - b. Don't waste water that has been treated.
    - c. Protect sources by good sanitation habits.

II. A. 4. Water may be contaminated by radioactive mist or dust or by chemical and/or biological warfare agents.

a. Check with civil defense health officials to be sure water is free from such contamination.

5. Tests can determine characteristics of water.

5 min L, C
Chap I
Part I
MWPP and
TM 5-295
par 4
b. (1) (b)
1.

B. Facts about treatment and disinfection of water.

1. Pathogenic organisms can be destroyed by chlorination.

a. The bacteria which cause some of the water borne diseases are easily destroyed by ordinary chlorination.

b. Amoebic cysts that cause amoebic dysentery resist ordinary chlorination but succumb to a heavier dosage.
- (1) Best to avoid suspected source.
- (2) Boiling kills the cysts.

Part I in
MWPP

2. Color in itself is not dangerous nor are varied tastes and odors.
    - a. Color caused by suspended matters in water.
        - (1) Reddish color—iron salts
        - (2) Brownish color—manganese salts as cedar swamps water.
        - (3) Green or bluish green—algae
        - (4) Dusty surface material—pollen

3. Chemical poison requires special treatment by/or with:
    1. Distillation
    2. Activated charcoal

C. Sources of water

10 L, C
Ref: Chap
IV in
MWPP

1. Ground wells and springs—usually clear.
2. Surface rivers, lakes, etc.
    - a. Exposed to weather and waste from man and animals.
    - b. Usually dirty.
3. Choosing sources for raw water:
    - a. First choice—Public system.
    - b. Second choice—Springs and wells.
    - c. Third choice—Rivers, streams, lakes and ponds.
4. Beware of sewage pollution.
    - a. Amoebic cyst resistant to ordinary chlorination.
    - b. 1 PPM ordinary residual after 10 minutes.
    - c. Amoebic cysts require residual slightly in excess of 2 PPM after 30 minutes.

5. Precautions for surface sources.
a. Take water well above sewer outlets.
b. Avoid counter currents in rivers.
c. Avoid natural drainage from rubbish.
d. Avoid oily areas.
e. Avoid drainage from fresh road tar and oils.
f. Always choose the clearest water.

2 min L, C D. Equipment needed.
1. Pumps, portable
a. Fire department.
b. Procure and store.

2. Transportation
a. Water sprinkler trucks
b. Glass lined milk tankers
(1) Clean and inspect for breakage of liner before use.

3 min L, C E. Emergency storage of water.
1. Salvage oil drums
2. Salvage bath tubs
3. Concrete swimming pools
4. Tarpaulin lined pit.

F. Methods of disinfecting water.
1. Boiling for 1 minute
2. Chemical disinfection

a. Calcium hypo-chlorite, sodium hypo-chlorite, iodine, potassium permanganate.

b. Army uses 5 grams ampules of Grade A calcium hypo-chlorite, one per 36 gallons of water.

c. Lyster bag holds 36 gallons of water.
(1) Chlorinate
(2) Test for residual after 10 minutes
(3) Results of test

13 min G. Emergency disinfection for disaster areas.

1. Every household has sodium hypo-chlorite in the kitchen or laundry room.

2. Well known as laundry bleach
3. Little known or used in US for chlorination of water.
4. Used widely in Europe.
5. 1 quart of bleach will disinfect 1536 gallons of raw water.
a. 1536 gallons is requirement for 768 people for 1 day for:
(1) Cooking

(2) Drinking
(3) Washing utensils
(4) Washing hands and face

6. Use bleach for chlorinating water—10 drops to each gallon of raw water.

NOTE: 2 tablespoons full = 1 oz. = 480 drops

7. Remember the water is not safe to drink or use until 30 minutes after the chemical disinfectant (sodium hypo-chlorite) is added.

5 min L, C
Ref: FM 21-10, par 56

H. Waste disposal—general.

1. There is great need for the public to be indoctrinated with proper emergency waste disposal methods in order to prevent widespread pollution of water sources.

10 min L, C

I. Disposal of solid waste (garbage).

1. We have the choice of:
   a. Burying
   b. Burning
   c. Burn off and bury residue.

2. Use covered cans for storing garbage.

3. Rules for use of cross trench incinerator:
   a. Keep garbage dry.
   b. Mix with cans and trash.
   c. Block off 3 trenches.

Ref:
FM 21-10
par 72 b

4. Construction of cross trench incinerator:
   a. Dig 2 trenches 1 foot wide—10 feet long—centers intersect at right angles.
   b. Grate is made of scrap rods or pipes.
   c. Stack is 55 gallon oil drum with both ends cut out

5. Capacity—2 per 500 men food outlet.

6. Rules for operation:
   a. Start fire on grate.
   b. Reinforce with second fire under grate.
   c. Don't smother fire by dumping in too much garbage at a time.
   d. Use trough drier.
   e. Keep burning mass loose.
   f. Periodically remove burned out cans, etc.

10 min
L Par 73a

J. Disposal of liquid waste:

1. Liquid wastes are best disposed of in a soakage pit.
   a. Kitchen liquids should first pass through a grease trap which:

(1) Removes soil clogging grease.
(2) Promotes better and longer absorption.

b. 25 to 30 feet from kitchen area

2. Soakage pit constructed as follows:
   a. Dig pit 6' x 6' x 6' or 8' x 8' x 8'.
   b. Fill with rocks and put in:
      (1) Ventilator pipes.
      (2) Over flow hose from grease trap.
   c. Fly proof with:
      (1) Screen or soaking and tarpaper.
      (2) Mound up earth.
   d. Resod mound to prevent muddiness in area.

Ref:
FM 21-10
par 74a

3. Grease trap constructed as follows:
   a. Build box 2'6" x 2'6" x 5'0" with baffles as shown in sketch.
   b. Set into ground approximately 18".
   c. Put in overflow pipe.
   d. Connect to overflow hose.

13 min L, C
FM 21-10
par 61

K. Disposal of Human Waste.

1. Adapt method of field armies who use deep pit box for latrines.
   a. Locate strategically in area of food outlets.
   b. Not closer than 100 yards.
   c. Where drainage will not pollute water sources.

2. Deep pit latrine constructed as follows:

a. Dig pit 2' x 6' deep, allowing 2' of length for each opening in latrine box.

b. Dig 6" depression that extends away from pit 4' in all directions.

   (1) Fly proof with burlap.
   (2) Allow to hang 18" into pit.
   (3) Soak with oil.
   (4) Cover depression with dirt and tamp down.

c. Carefully fit latrine box over pit and pack with earth.
   (1) Box constructed to accommodate 1 person for every 2 feet of trench.
   (2) Has self closing lids.
   (3) Has spindles for roll of paper.
   (4) Has large tin cans that can be inverted over rolls of paper when it rains.
   (5) Latrine seats scrubbed daily and sprayed with DDT,
   (6) Spray causes fire hazard so "NO SMOKING" signs should be displayed.

d. Dig drainage ditch all around latrine box.

e. Close when abandoned or filled within 2' of top soil.

- (1) Remove box.
- (2) Spray with oil or DDT.
- (3) Fill with earth and mound over 12" to 18".

f. If animals should unearth the latrine contents:
- (1) Mix broken glass with dirt used to fill pit.
- (2) Cover mound with brush and rocks.

g. Mark the site "CLOSED LATRINE".

h. Hand washing or dipping cans should be provided.
- (1) Wash cans contain soapy water.
- (2) Dip cans contain heavy solution of bleach (4 oz. to gallon).
  - (a) Dip hands in solution
  - (b) Shake well and allow to air dry.

12 min L, C

III. SUMMARY

A. During this period we have established the importance of a safe emergency water supply, and the need for definite plans of action to insure this supply.

B. We know the danger of water-borne diseases and how they can spread if prompt action is not taken to safeguard the public health.

C. We have outlined some rules for water discipline:
1. Use only safe water.
2. Don't waste water.
3. Protect the sources.

D. We know that we can disinfect badly polluted water when required to do so.

E. We also know that water polluted with sewage may contain amoebic cysts which are resistant to ordinary chlorination, but are destroyed by boiling.

F. We know that color in itself is not dangerous.

G. Our water sources are:
1. Ground water—wells and springs.
2. Surface water—rivers, lakes.

H. In using surface sources avoid all drainage from questionable areas.

I. We realize the need for planning the supply of portable pumps and transport facilities for the water.

J. We have discussed improvised methods of storing the water.

K. We know of a powerful weapon available almost anywhere namely sodium hypo-chlorite popularly used as a laundry bleach.

L. We know how to dispose of our waste matter in a sanitary manner. The importance of this operation can not be over emphasized as poor disposal can result in polluted water and wide spread epidemics.

In a word let us be sanitation conscious.

MANUSCRIPT

WATER PURIFICATION AND SANITATION

Disaster survivors must be promptly warned that all untreated water is unsafe, and unless control measures are instituted immediately, the spread of disease can easily reach epidemic proportions.

Initially, we have no way of determining whether the water supply is or is not contaminated. Therefore, until the water's safety is established, it is imperative that we take immediate precautions. One of the dangers of a disaster is that pressure may develop near water mains and sewer pipes to a degree sufficient to cause ruptures. It can easily be seen that such underground damage could go undetected and uncorrected for a long period of time. Contamination and pollution can take place unhindered under such circumstances, an epidemic of water-borne diseases can readily develop. These diseases are typhoid and paratyphoid fevers, cholera, schistosomiasis, bacillary dysentery, amoebic dysentery and diarrhea· Cholera and schistosomiasis are not likely to occur in the United States. The other diseases are ordinarily kept in abatement, and a general source of infection eliminated by our careful disinfection of all public water supplies. However, these diseases could easily crop up in many places and spread like wildfire if we do not take very prompt action on water discipline and disinfection during a disaster. Water discipline rules are: (1) Drink treated or approved water only (2) Don't waste disinfected water (3) Protect source of water by good sanitary habits and if necessary water guards can be posted.

There is no way of determining the potability of water except to test samples very frequently. These tests which must be made in a laboratory or by a field testing unit, will determine the physical, chemical and bacteriological characteristics of the samples tested.

Because it will take time to set up and establish a testing routine, we must take action immediately to insure the safety of all water to be used for cooking and drinking.

Certain facts must be taken into careful consideration before we set up an emergency water disinfection station. These facts are:

1. Water may be contaminated by radioactive mist or dust; chemical and/or biological warfare agents may be introduced into the water supply either as a result of open military action or by sabotage. Always check with civil defense health officials to be sure your water supply is free from such contamination.

2. Pathogenic bacteria which cause waterborne diseases can be destroyed by chlorination or by boiling the water for one minute.

3. Color, in itself, is seldom detrimental to the safety of water. Tastes and odors also have little relation to the safety of water. When color or taste and odor are too noticeable, people turn away from this water, even though it has been disinfected. The danger is, of course, that they will turn to a supply of unknown safety.

4. Chemical contamination or poisoning in water cannot be neutralized or removed by chlorination or boiling. It requires distillation and treatment with activated charcoal to remove chemical poisons from water.

5. Although amoebic dysentery cysts can be destroyed by a heavier than usual dosage of chlorine, it is wise to avoid any source of raw water that is possibly polluted by sewage, as raw sewage is the only possible carrier of these cysts, which are found in the feces from an infected person.

In view of the established facts we can see that even though our public water supply is possibly contaminated, it may be our best source of water because there will be little danger of accidental chemical pollution. The bacteriological contamination we can cope with by emergency chlorination methods such as those described later.

We can set down a few important precautions to observe in the choosing of a natural supply of water to be treated. Water comes from one of two sources: (1) From below the surface of the ground as from wells and springs or (2) from the surface as from lakes and streams. Water taken from the first is known as "ground water". Water from the latter source is termed "surface water".

Since surface water is exposed to the weather and wastes from man and animals, it is usually dirty and therefore requires more thorough treatment than ground water which is better protected. We must remember that either of these waters can contain organisms which are detrimental to health.

Therefore, let us say that in choosing your source of water for the emergency disinfection station, consider the following:

1. In populated areas use established public systems to the fullest extent.

2. Use existing springs or wells next. The quality of water from the ground is usually better than that of surface water.

3. If public or ground sources are not available, use surface water sources such as rivers, streams, lakes or ponds, in that order.

When using surface sources, take the following additional precautions to be certain you are obtaining the best raw water for your use:

1. Take the water from a point well above sewer discharges.

2. Counter currents are frequently found in rivers. Look out for them in relation to the place from which you obtain your water.

3. Do not take water from a place where natural drainage from a refuse pile or dump drains into the stream or other source. This may be just as dangerous and have as serious consequences as though you had taken your water from a point near a sewer discharge.

4. Stay away from oily areas or areas where oily wastes and drainage have imparted oily or chemical tastes to the water. Disinfection can not remove this objectionable taste and the consumers will be driven to water of unknown safety.

5. Choose the clearest water possible because it will be more acceptable after disinfection.

6. Toilets (improvised) must be located so that natural drainage (surface or underground) will not contaminate and pollute your chosen source of water.

7. Drainage from freshly tarred or oiled roads will cause a reaction when treated with chlorine. This reaction causes a penetrating taste and odor but has no physiological effect on the consumer.

Now that we have carefully considered and chosen a source of water, we must think of transporting it to the places where it will be disinfected and used. Fire departments usually have water pumps for fire fighting in areas where no pressure hydrants are available. However, do not plan to be able to borrow one of these. Every piece of fire fighting equipment may be sorely needed for its primary mission. Of course, if available make use of it. We have discussed this matter merely to point out the need for this type of pump for securing water in any great quantity.

Water sprinkler trucks and glass lined tank trucks (usually used for hauling fresh milk) may be pressed into service as water transports. Needless to say, they must be thoroughly cleaned and inspected before being used for this purpose. The water can be stored in salvage oil drums that have had one end cut out. Other large containers that may be available can also be used.

A concrete swimming pool could be thoroughly scrubbed out, rinsed and used for storage of disinfected water.

In this case some type of cover or device should be constructed to protect the water as much as possible by keeping people and animals from helping themselves to the limited supplies and possibly re-contaminating it.

Actual disinfection of the water after it is in the tank is not practical unless the capacity in gallons can be quite accurately determined. It is better to disinfect the water in smaller quantities as required for use.

In an emergency we find that we have two methods of making our water safe for consumption.

1. Boil all water to be used for cooking and for drinking, for one minute.

2. Disinfect the water by using a chemical disinfectant.

Some of these chemicals are calcium hypochlorite, sodium hypochlorite, iodine and potassium permanganate.

The Army uses .5 gn calcium hypochlorite ampules, one ampule to every 36 gallons of water. These ampules may be hard to find in an emergency. In such a case we can use sodium hypochlorite instead. Almost every housewife has sodium hypochlorite in the kitchen or the laundry room because this chemical solution is well known for its wonderful properties as a laundry bleach. However, it is little known for its wonderful properties as a chlorinator of water for disinfection. Regardless of brand name your household bleach is a solution of sodium hypochlorite and 10 drops of this solution will render one gallon of raw water safe for human consumption in just thirty minutes.

Two tablespoons full equal one ounce or 480 drops, therefore we can figure that one quart of bleach will disinfect 1536 gallons of water which is minimum requirement for 768 persons for one day. Two gallons of purified water are required for each person.

Remember, the water is not safe to use until the sodium hypochlorite has been in the water for 30 minutes.

Water that has been boiled should also have 10 drops of bleach added to each gallon in order to reduce the danger of re-contamination. At this rate, one teaspoon of bleach will treat eight gallons of boiled water and 1 oz. or two tablespoons full will treat 48 gallons of boiled water.

Emergency Waste Disposal

In this emergency we find that our normal means of disposing of waste materials have been disrupted and we are left to our own devices to cope with this problem in so far as it pertains to our kitchen and eating areas.

We have long taken for granted the twice weekly pickup of our solid garbage and the use of our kitchen drains and water closets for the disposal of kitchen liquids and body wastes. Now, suddenly all of these facilities cease to operate. We cannot allow bad sanitation habits to develop and we must not pollute our streams and other possible sources of water.

Immediate instructions must be disseminated by the quickest possible means to all kitchen personnel concerning some of the better ways to cope with this problem in a sanitary way.

Let us first consider the problem of solid garbage which will include cans and glass. We have two choices and a combination of the two which may well be our best solution. Solid waste can be disposed of by burying in the ground, or by burning it in an improvised incinerator. A combination of these two methods, *i.e.*, burn off all burnable parts of the garbage and only burying the residue, may make our job a little easier.

There are some rules that must be followed in order to have proper incineration. These are:

1. Keep all of the garbage as dry as possible. Drain and squeeze all excess moisture out of the garbage before placing it in a can where it is to be kept until burned.

2. Mix cans and glass items with the burnable trash and garbage. The cans and glass items will not only be burned clean and odorless, but they help in keeping the burning mass loose so it will burn well.

3. When a cross trench incinerator is used, block off three of the trenches, leaving the one to wind-ward open so that it can gain the maximum draft.

A cross trench incinerator is constructed in the following manner:

1. Dig two trenches 1 foot wide and 10 feet long so that their centers cross at right angles. Each trench slopes from the surface of the ground at the ends to a depth of 18 inches at the center of the intersection.

2. A grate, made of small iron bars or pipes placed two or three inches apart, is placed on the ground over the intersection.

3. On this grate place a 55 gallon drum which has had both ends removed.

Two of these cross trench incinerators properly operated will take care of the garbage from an emergency food outlet feeding up to 500 persons.

Operate as follows:

1. Start a fire on top of the grate. If it is hard to keep this fire going, when garbage is added, reinforce it with another fire under the grate.

2. Be careful not to smother the fire by dumping on too much garbage and trash at once.

Wet garbage can be partially dried by placing it in a metal trough (cut from an oil drum) placed over one branch of the cross trench.

Garbage in a trough, so placed, will be dried out from the heat of the fire that is kept burning at the trench intersection. Remember, garbage will burn better if it is mixed with dry burnable trash and tin cans.

Periodically the burned out cans, etc., must be removed, flattened, to take up less space, and buried in a pit dug for this purpose.

Liquid wastes are best disposed of in a soakage pit. All liquid wastes from a kitchen should first pass through an improvised grease trap that will remove the soil clogging grease from the liquids and promote better and longer absorption into the soil. The best type of soil for soakage pits is that with a sandy or gravelly texture.

The soakage pit with grease trap should be located fairly close to the food preparation area.

Twenty-five to thirty feet is a reasonable distance from the kitchen for this very important facility to be placed.

We construct a soakage pit as follows: Dig a large pit, the size of which will be determined by the amount of liquids that must be handled. For a feeding outlet serving up to 500 people, the pit should be six to eight feet square and just as deep. Fill the hole with rocks, crushed concrete, bricks, etc. Fill it to within a few inches of the ground level and then cover with wire screen or a matting of burlap sacks. This screen and matting is to aid in fly proofing the pit.

Before the screen or matting is placed on the pit we should put in our ventilator pipes and the hose which will handle the overflow from the grease trap. To handle the ventilation, we insert two pieces of two inch pipe into the pit when it is approximately half filled with rocks. The pipes should be long enough to extend 10 to 12 inches above the ground level. Pieces of screen wire are placed over the tops of the pipes and wired into place. The overflow hose from the grease trap can be inserted into the pit when it is filled to within 12 to 18 inches of the top. Now, when the pit is filled to within a few inches of the top, we place our screen or sacking in place. Cover this with tar paper, if possible, and mound up the earth to a height of about six to eight inches. The bulk of the dirt originally taken away from the pit can be hauled away and the mound over the pit sodded over to prevent having a muddy area near the kitchen.

The grease trap is constructed like a large box with two wooden baffle walls built in. The whole box is set down into the ground as shown in the accompanying sketch. The liquids are poured in. The grease congeals and rises to the top of the water in the box. As the water level rises in the box the water in the protected overflow compartment also rises and the grease free overflow runs off through the hose into the soakage pit where it is absorbed into the ground.

Now we must consider the disposal of human waste because our public sewage disposal system is, for the most part, inoperative. We can adopt the method used by our field armies when in temporary camps. That is to dig and construct deep pit type box toilets.

Toilets will have to be strategically located in reasonable proximity to the kitchen area. But these facilities should not be established nearer to an emergency food outlet than one-hundred yards. We construct a deep pit toilet as follows:

1. Dig a pit about two feet wide, and six to eight feet deep. The pit or trench will be dug long enough to accommodate your toilet box which will be built with a self closing lid over each opening.

2. After the trench is dug, a six inch deep depression is dug to extend out from the trench four feet on all sides. Oil soaked burlap is now placed over the surface area. In addition to covering the surface area the oil soaked burlap is allowed to hang down into the pit at least eighteen inches.

3. The earth is then replaced over the area, tamped down and more oil is added.

4. The toilet box is then carefully fitted over the pit and the earth is packed tightly around the edges of the box to seal it and make it flyproof.

5. Visual privacy can be provided by improvised screens of canvas, etc.

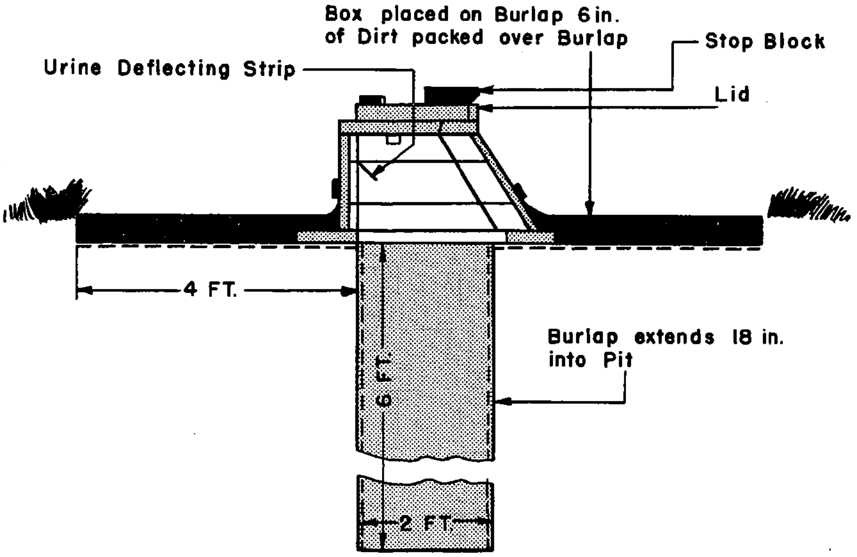
Toilet seats must be scrubbed daily with soap and water. The seat covers should not be propped open when drying because the flies must be kept out. Daily spraying with residual DDT solution will aid in preventing flies from breeding.

A drainage ditch six inches deep should be dug all around the toilet box so that surface drainage will not fill up your toilet and render it useless. Always see that proper paper is provided. Large tin cans make a very effective protection for the rolls of paper in rainy weather.

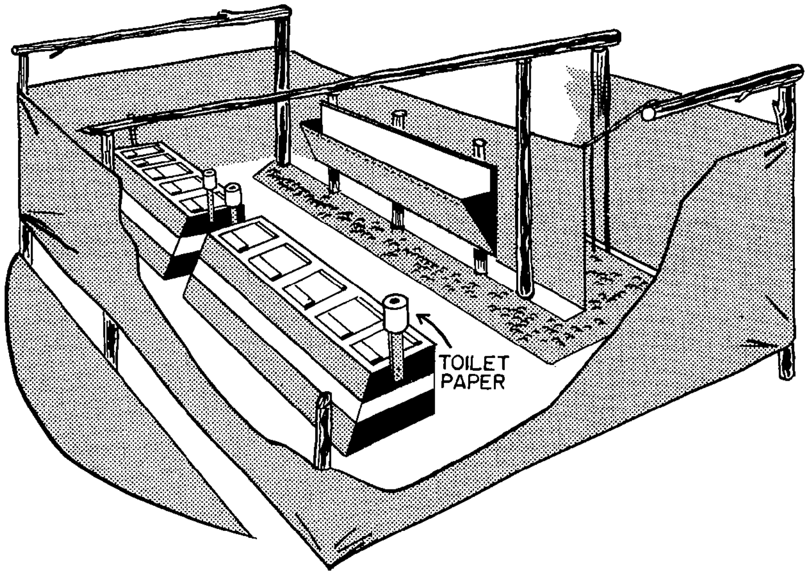
Materials should be provided for hand washing or hand dipping. Wash cans containing soapy water or dip cans containing a heavy solution of bleach (4 oz. to the gallon) will serve the purpose.

Deep pit toilets are closed when abandoned or when filled to within two feet of the surface of the pit. The box is removed, the pit is sprayed with oil or DDT and covered with burlap. Next we fill the remaining two feet with dirt (oil soaked if the soil is loose or sandy). Pack the dirt down firmly and mound up twelve to eighteen inches above the ground level. If animals are in the area and are likely to unearth the fecal matter, broken glass bottles should be mixed with the dirt used to fill up the pit. Mark the side "Closed Toilet" so that the same spot will not be used again. For details of construction, see diagrams and charts that follow.

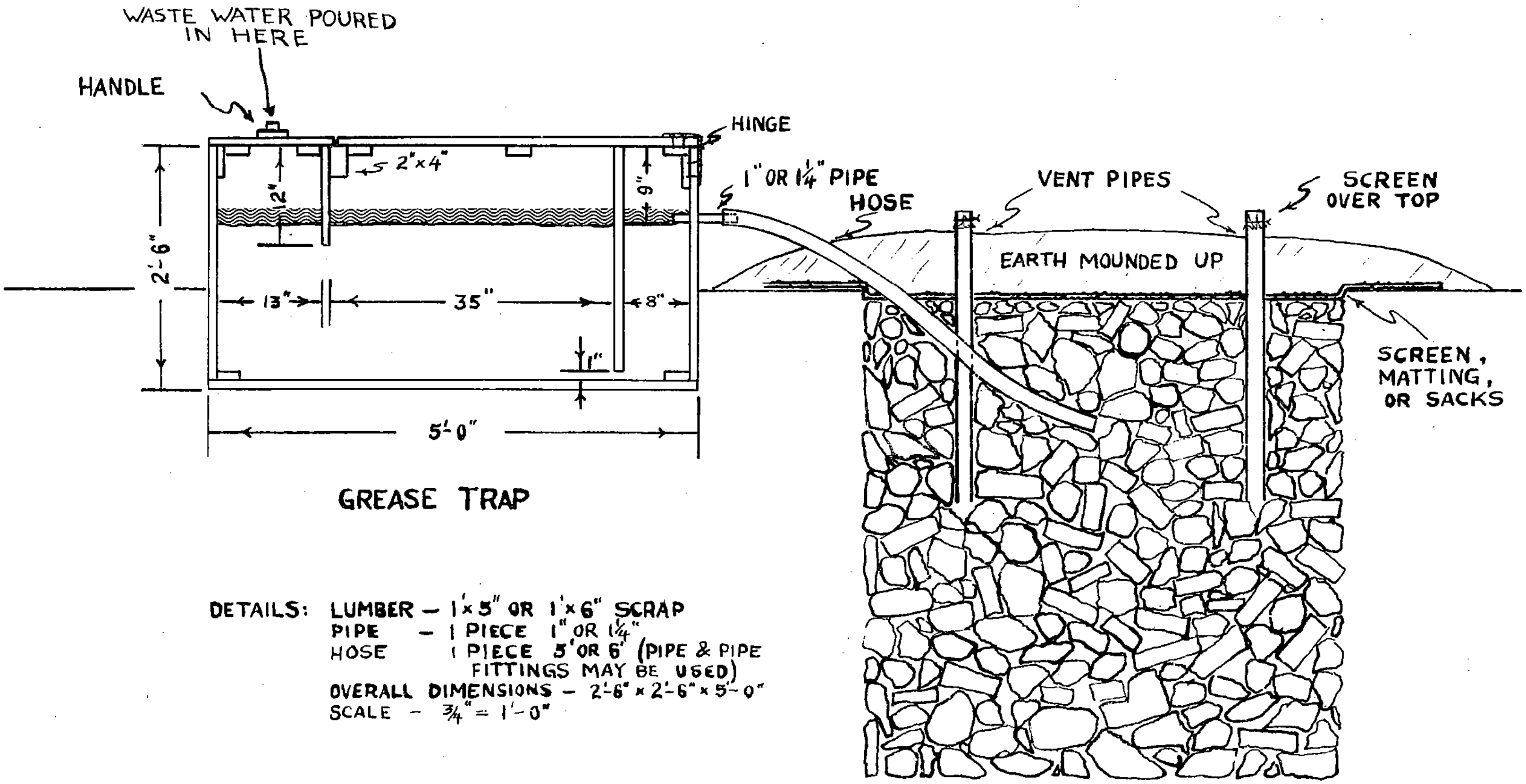
Note. During use there is a fire hazard and smokers should be warned that the DDT spray causes explosive fumes. "No Smoking" signs should be prominently displayed at all field toilets.


Box placed on Burlap 6 in. of Dirt packed over Burlap
Urine Deflecting Strip
Stop Block
Lid
4 FT.
Burlap extends 18 in. into Pit
6 FT.
2 FT.

Schematic Diagram of Deep Pit Latrine



DEEP PIT LATRINES FOR 100 MEN, WITH LATRINE SCREEN.



GREASE TRAP

SOAKAGE PIT

DETAILS: LUMBER — 1'x5" OR 1'x6" SCRAP
PIPE — 1 PIECE 1" OR 1¼"
HOSE 1 PIECE 5' OR 6' (PIPE & PIPE FITTINGS MAY BE USED)
OVERALL DIMENSIONS — 2'-6" x 2'-6" x 5'-0"
SCALE — ¾" = 1'-0"

LESSON PLAN

PAGE 1
OF 7 PAGES

COURSE Disaster Feeding	SUB-COURSE

UNIT OF INSTRUCTION Prevention of Food Contamination and Food Poisoning.	Schedule No.	No. of Hours 35 minutes

SCOPE

Problems involved in the prevention and control of food poisoning in disaster feeding situations. Types of food poisonings, events leading to the food poisoning situation and the best methods of preventing the outbreak. Field expedients used to maintain sanitation and personal hygiene as a method against the transmission of disease by food. Types of foods normally reported as vectors of food poisonings.

OBJECTIVES

To have the students attain:

1. An understanding of the potential danger in food poisoning outbreaks during disaster feeding.

2. An understanding of the field expedients used to lessen the potential of food poisoning.

3. An appreciation of the types of food poisonings and the best methods for their elimination and retardation.

4. An appreciation of types of foods involved and safest foods to use during a disaster feeding situation.

REFERENCES

SR 41-30-1

STUDY ASSIGNMENT

TEACHING AIDS

QMTC 29

LESSON PLAN (CONTINUATION SHEET)

CODE NUMBER

3 min
L

I. INTRODUCTION

A. Motivation

1. Earlier this morning you have been oriented on the importance of personal hygiene and sanitation.

2. Certain specific phases of this problem have not been discussed as yet, that is, the ever potential danger of large outbreaks of food poisoning.

3. All of the post disaster effort may be destroyed by a mass outbreak of food poisoning.

B. Objectives of this unit of instruction is to have the student attain:

1. An understanding of the potential danger in food poisoning outbreaks during disaster feeding.

2. An understanding of the field expedients used to lessen the potential of food poisoning.

3. An appreciation of the types of food poisonings and the best methods for their elimination and retardation.

4. An appreciation of the types of foods involved and the safe foods to be used during a disaster feeding situation.

3 min
L, C

II. PRESENTATION

A. If sterilization under any situation could be feasibly accomplished, food poisoning might easily be eliminated. Sterilization is neither possible nor practical under disaster feeding situations. In order to take the logical and practical approach in lessening the danger we must first understand the requirements that are advantageous to bacteria, the causative agents.

Food
Poisoning
General

1. All bacteria capable of producing food poisoning require moisture and warmth.

2. Environment may be described as the ability of bacteria to exist in conditions where sanitation and hygiene are at a minimum.

13 min
L, C
Bacteriology
and
Immunology

B. The practical control, therefore, is to eliminate the possibility. We cannot eliminate bacteria, but by controlling such factors as heat and moisture we can lessen their potential.

C. There are two distinct types of food poisoning. They are classified according to their variation.

1. Toxications

a. A toxication is caused by bacterial secretions when bacteria of a specific type are allowed to grow in food between 50-110° F. The secretion (toxin) is a natural part of their life.

b. Organisms of this type are quite diversified in nature and are always found on the human body.

(1) Found in nasal passages, on the skin and on the hand.
(2) Also found in pimples, boils, etc.

Food Poisoning General

c. Most food must be handled to a degree and it is therefore impossible to eliminate all bacteria from food in a mass feeding situation.

d. The best we can do then is—PREVENT THEIR GROWTH. This prevents large amounts of secretions.

(1) Refrigeration to temperature below 45° F. is the best means of accomplishing this.

  (a) In the absence of portable refrigeration and in the post disaster situation, no reliable utility can be assumed. Field expedients are therefore an immediate necessity **whenever food is to be stored.**

  (b) Root cellars may be dug to cool foods. These simple storage areas are usable where the ground is cool and midly damp. They are dependent solely on the temperature of the ground. The cover should have an air space to protect it from any surface heat.

    1. The name root cellar implied digging into a rooted area and obtaining the coolness from sub-surface free roots.

    2. Underground boxes are the same except they do not have root growth and protection.

  (c) If watertight containers are available they may be immersed in swift running streams or rivers which are normally cool. Immersing in deep wells is an age old custom, but is only suitable for small quantities.

(2) Inspection of food to insure that it is not especially prone to bacteria infestation is another way of limiting or lessening bacterial growth.

(3) Inspection of personnel is also important for it is through various personnel involved the bacteria gain admission to the food. Two distinct groups of symptoms should be watched for.

  (a) Any person who exhibits outward signs of disease *i.e.*, boils, pimples, rashes, open sores, wounds, lacerations, sneezing, heavy colds, etc., should be screened out.

  (b) Other manifestations of disease may be diarrhea, general weakness, running eyes, spasmodic cramping, etc.

Food Poisoning General; Meat Hygiene, General

(4) Under no circumstances should people in this category be permitted to serve food. Preclusion of proper physical examination may be assumed under disaster situations.

(5) Eliminating foods which are normally vectors of food poisoning from the menus is still another control. These

foods, which lend themselves to bacterial growth, even though they are pure and edible in themselves, include the following:

(a) Cream sauces
(b) Mixed salads
(c) Hamburgers
(d) Bread puddings
(e) Foods which require much handling in making.

Food
Poisoning
General

c. The temperatures of 50-110° F. are considered the critical temperatures. Within this range bacterial growth is rapid. Above or below these temperatures, bacterial growth is sluggish and retarded. When cooking or when cooling, get through this critical temperature range as quick as possible and in no case should foods be allowed to remain in this range for a period in excess of *three hours.*

d. The common toxin which we have spoken of is the most dangerous because it is heat stable. Once it has been elaborated in food, no amount of cooking will destroy it. In other words—TOXIN FORMATION MUST BE CUT DOWN.

Bacteriology
and
Immunology
General

2. Infections

a. Infections are caused by eating foods which contain large numbers of living bacteria. In a toxication, organisms may be living or dead.

b. These bacteria (infection type) are planted in food in three ways.

(1) Insanitary contact with foods by hands, clothing, etc.
(2) Contact of food with insects and rodents who are natural reservoirs of these infectious agents.
(3) Uninspected food which may be naturally infected.

c. This type of food poisoning may be effectively eliminated by thorough cooking. (This means visual sight of steam in the middle of a product.)

d. Reproduction of the bacteria is between 50-110° F. This again is the critical temperature and any processing of food through these temperatures should be rapid or at least a maximum of three hours.

e. Moist heat is always more effective in killing bacteria and should be relied upon whenever possible.

D. Milk is always a critical item in any disaster. Its physiological and medical properties are known to all. All local raw milk should be discarded as a source. Local pasteurized milk, if in a good undamaged cool bottle may be used IF CLEARED BY MEDICAL AUTHORITIES. Canned milk or dried powdered milk is the best for safety's sake.

1. CAUTION: When a can of milk is opened or when dried powdered milk is reconstituted, treat it with the same precautions as you would fresh milk.

2 min
L, C

E. Dehydrated foods in disaster feeding are desirable because dehydration eliminates one of the prior prerequisites of bacteria—MOISTURE.

1. Caution should be practiced in rehydrating dehydrated foods because they become as prone to bacteria as fresh foods with the introduction of moisture.

2. Be sure that water used in rehydration is pure. If in doubt—BOIL, cool and use.

3 min L, C
Food Poisoning General
Meat Hygiene General

F. Cans of food which have spoiled or have been punctured may cause food poisoning.

1. Any can which exhibits any swelling, malformation, breakage or excessive rusting should be thrown out.

2. If any off color or flavor is noticed, the can should be thrown out.

3. Cans should also be washed with safe water before being opened.

2 min
L, C

G. Certain basic rules will eliminate the possibility of chemical food poisoning.

1. Do not store chemicals such as paint, sprays, insecticides, rodenticides, etc., near food.

2. Do not use GALVANIZED CANS for storage or cooking of acid food products.

3. Do not use drums, cans, etc. unless they are thoroughly clean. (Special emphasis is placed on the use of cans containing gasoline, etc. Residual lead is a constant hazard to health)

2 min
L, C
Food Poisoning General
Meat Hygiene, General

H. The following listings of foods are those which have been reported as the causative foods in food poisoning outbreaks over a period of ten years. The foods are listed in the order of their numerical case history.

TOXICATIONS

Cream fillings
Baked or Boiled Cured Ham
Meat, fish, vegetable and poultry salads
Gravies and sauces
Custards
Gelatin mixtures
Cream products
Milk and ice cream

INFECTIONS

Meat and poultry stuffings
Hash and croquettes
Meat brains
Uninspected meats, eggs and poultry
Raw vegetables from unapproved sources
Undercooked meats, fish and poultry
Unpasteurized and raw milk
Rat and Insect damaged food

2 min
L, C

I. Keep menus simple. Certain foods are safer than others. These include soups, carved meats and vegetables, dehydrated potatoes, fruits and vegetables, canned milk, canned fruits, packaged cookies, crackers and biscuits.

1. Stay away from raw vegetable foods because they require a great deal of handling.

2. Avoid intricate pastries.

3 min
L, C
Bacteriology and Immunology, General

J. There are five techniques which, when used in combination with one another will definitely lesson the danger of food poisoning.

1. Refrigeration
2. Sanitation
3. Personal Hygiene
4. Cooking and Processing
5. Insect and Rodent Control

K. Check with civil defense radiological monitors to be sure that the food to be used is sufficiently free of radioactive contamination to permit consumption.

1. Contents of cans, jars, cartons, and other food packages that have not been broken or punctured would be safe to eat.

2. Cooking or eating utensils should be checked to be sure they are free from radioactive dust or mist.

Food Poisoning
General

a. Refrigeration prevents the growth of bacteria which are capable of causing food poisoning. Leftovers must be cooled quickly and stored. Use always within 24 hours. Leftover milk discard. Cool foods to approximately 110° F. prior to refrigeration or field expedient.

b. Sanitation requires the knowledge of proper cleaning methods. Utensils scalded, work tables scraped, dried and treated with vinegar.

c. Proper cooking requires that heat be generated in the center of a product to produce steam. Certain foods are not cooked and must be maintained cold. During serving, keep hot foods hot and only expose cold foods for short periods of time.

d. Personal Hygiene implies the highest degree of cleanliness possible while handling food. Do not sneeze, cough or talk directly on food. Always wash hands after using latrine and in field conditions a can of heavily chlorinated water should be available for hand dipping prior to work. If you are sick DON'T HANDLE FOOD.

e. Insect and Rodent Control. This country has basically a closeted type of sanitation which requires continuous control. In disasters, uninhibited, insect and rodent infestation is normal. Rats, flies and cockroaches carry bacteria to food.

6. Keep foods covered and protected from insects and rodents. If rodent infestation is heavy, food may have to be suspended in containers from trees. Any screen, wire fence, etc. should be salvaged to protect supplies.

3 min
L, C

III. SUMMARY

A. There is no method for completely eliminating the possibility of food poisoning from contaminated food.

1. The seriousness of this fact is magnified during a disaster because people are in a weakened or shocked condition and thus more susceptible to disease.

2. Outbreaks of food poisoning are characterized by their explosive properties.

3. Most food poisonings are not killers and recovery is fairly rapid.

B. Finding the causative agent in cases of food poisoning is unsatisfactory under excellent conditions. The main clues to food poisoning are found in samples of food involved. It is suggested that if possible a small sample of each food served at a meal be placed in a covered container and refrigerated or cooled.

IV. STANDBY MATERIAL

A. Symptoms of food poisonings.

B. Treatment of affected people and methods of arresting a widespread outbreak.

MANUSCRIPT

CONTROL OF FOOD POISONING IN DISASTER FEEDING

The importance of hygiene and sanitation has already been discussed from the point of view of preventing contamination and disease. A more complete and realistic concept is necessary. In this section we will particularly emphasize the specific control which can effectively be used to eliminate the possibility of bacterial food poisoning in disaster feeding.

The first requirement is to understand the causative agents in food poisoning. We must also have knowledge of the various type agents and the more practical means of elimination.

Without a doubt, sterilization is the best method. True sterilization is often neither practical nor possible even under good conditions. In disaster feeding more practical considerations must be made. All bacteria capable of producing food poisoning require moisture, food and temperatures between 50° and 110° F. The closer we can come to dryness, proper refrigeration, thorough cooking and good sanitation, the closer will we approach safety and elimination of food poisoning.

There are basically two distinct classifications of bacterial food poisonings.

1. Toxications—are the result of bacterial secretions when bacteria capable of producing toxins are allowed to grow in food for several hours at a temperature between 50° and 110° F. These bacteria are very common in nature, owning a very diversified habitat. They are a normal part of the human bacterial flora and it is relatively impractical to eliminate them from food which is handled. These bacteria cause the most common type of food poisoning and therefore are of major consideration.

a. The best control of toxications is the quick cooling and refrigeration of all foodstuffs which will actively support their growth. If mechanical or ice refrigeration is unavailable, field expedients may be used. Root cellars or underground storage areas are suitable if temperatures are below 50° F. Food may be placed in watertight cans and suspended in a running stream of cold water. Another method is the use of refrigerator principles. Wet blankets, placed around pots which have tight fitting lids, reduce heat quickly when allowed to remain in a strong air current. This expedient produced commendable results in Africa where there was a dry atmospheric condition and an average temperature of 100° F.

b. Careful screening of personnel is a must in eliminating those who are carriers of disease. Outward signs of disease are easily discernible to the lay observer. All pimples, boils, skin eruptions, lacerations or off colored skin are indications of disease. Of course, it is to be realized that in a disaster of any type available personnel who bear the above signs cannot be declared carriers without being first examined by competent medical authorities. People who have diarrhea, heavy colds, etc., must be rejected as food handlers.

c. Eliminate foodstuffs which are commonly reported as vectors of food poisoning toxications such as creamed dishes, hash, puddings, poultry salads, etc.

d. Proper, quick and thorough cooking of all food which requires cooking, especially through the critical temperatures of 50° to 110° F. is essential.

2. Infections are caused by the ingestion of food containing large numbers of living bacteria. These organisms must be alive and in great numbers to cause illness. Unlike toxications where the bacterial secretion causes the illness by affecting the neuro system of the body, infections allow the living organism to attack the bowel directly. Production of toxins by this type bacteria is unknown.

Organisms of this type are normally planted in food in these three ways: (1) Insanitary handling of food by people with dirty hands, clothing, etc. (2) Infestation by insects and rodents who carry a great number of disease producing bacteria (3) Eating of animals and their products who during life were host to various disease organisms.

Many of these organisms are the natural flora of water rodents and animals and are mechanically carried by insects. Although they are in such great numbers and so widely spread, *they can be effectively* eliminated by thorough cooking.

The majority of these organisms have their best reproduction range between 50° and 110° F. Whenever possible these critical temperatures should be avoided when holding food and passed through as rapidly as possible when cooking or cooling food.

Moist heat methods are the most effective methods in eliminating food infections. Foods which are commonly reported to be vectors of food infections should be heated to an internal temperature of steam 210° F. for safety.

Milk, which is normally a critical item in a disaster, should be carefully handled. Any local supplies in a disaster area should be regarded as potentially dangerous. If pasteurized milk is found in clean bottled or packaged containers, it *should not* be used until passed by medical authority. Raw milk *must never* be used.

Canned and powdered milk are safe items if handled carefully. Once a can of milk is opened or dry milk is reconstituted, it becomes equally as suspect as other milk. If used within three hours and stored carefully prior to usage, there is little danger. If three hours have elapsed, milk should be scalded before use. Scalding milk does not materially lessen the nutritional value and it provides safety.

Be particularly careful of dehydrated foods. In themselves, they are safe and sound if kept packaged until used. A safe water supply must be used to rehydrate these foods. If in doubt, *boil* water prior to rehydration.

Once a food is rehydrated all principles involved in handling fresh foods must be followed. •

Spoilage in canned foods should be thoroughly recognized as a potential hazard in disaster feeding. If cans are swelled, leaking or unusual in appearance, or if they have an offensive internal odor or smell, they should not be used. They should be destroyed!

Eliminate the possibility of chemical food poisoning by eliminating the use or storage of any toxic chemicals, insecticides, rodenticides, etc., near food.

The following lists of foods are divided into two groups. These foods are most commonly reported as vehicles of food toxications and infections.

TOXICATIONS

Cream fillings
Baked or boiled cured ham
Meat, fish, vegetable and poultry salads
Gravies and sauces
Bread, cereal and fruit puddings
Custards
Gelatin desserts and mixtures
Creamed products

INFECTIONS

Meat and poultry stuffings
Meat loaves and hamburgers
Croquettes and hash
Cream fillings and sauces
Meat brains
Uninspected meat, eggs and poultry
Raw vegetables from unapproved sources
Undercooked meats, poultry and fish
Unpasteurized or raw milk

It is recommended that under disaster feeding conditions, menus must be as simple as possible. Foods which require a great deal of handling should be avoided. These foods are:

Cream sauces
Salads, meat, fish and poultry
Hashes
Puddings
Mixtures of gelatin
Dressings and stuffing
Raw vegetables
Croquettes
Fresh foods, where applicable

Simple foods which require a minimum of handling are recommended. Such foods are:

Soups
Canned meats and beans
Canned vegetables
Dehydrated potatoes
Canned juices
Powdered or canned milk
Canned fruits
Packaged cookies, crackers and biscuits

Keep menus simple. Avoid over preparation and leftovers. Prepare food as close to serving time as possible and keep hot during serving. If some unforeseen delay causes the elongation of servings, keep foods hot and covered.

There are five general techniques which, when applied, will reduce the possibility of food poisoning. These are refrigeration, sanitation, personal hygiene, cooking and processing and insect and rodent control.

It is not possible to use one without the other. They are a combination of defenses which will not only lessen the chances of food poisoning, but will not deter from the normal efficient operation of a feeding facility.

Refrigeration inhibits and prevents the growth of bacteria which are capable of producing food poisoning. All these bacteria, except rare isolated examples, grow best in temperatures of 50°-110° F. By keeping the temperature lower, around 42° or below, the foods involved will be safe. Food poisoning organisms belong to the moderate temperate group that have a minimum growing temperature of 59° F. Below this, their growth is sluggish and reproduction slow. Bacterial growth is still a possibility in temperatures below 42° F., but these bacteria *do not cause* disease. Their eventual spoilage can be quickly recognized by the lay cook from sight and smell.

Stored foods should have good air circulation which prevents moisture from accumulating on surfaces of food, thereby eliminating a basic necessity of bacteria.

Stored foods should be covered *lightly*. This method allows escape of heat, but prevents air contamination by bacteria.

Leftovers should be stored carefully and used within 24 hours, sooner, if possible.

Keep pasteurized, rehydrated or open canned milk covered and refrigerated. Once a container has been exposed to air in the presence of people for a period of serving, it should not be restored nor reused.

Foods should be cooled to 110° F. prior to being refrigerated. If mechanical refrigeration is not available, it is recommended that foods be changed from their original container to a container which exposes more of the substance to air, kept covered and placed immediately in the field cooling expedient discussed earlier.

Sanitation requires the knowledge of proper cleaning techniques for equipment. Food handling equipment should not only be cleaned, but sterilized also. Wood surfaces should be scraped clean and treated with a light disinfecting agent. Pure vinegar is an example. Whenever possible, utensils and portable equipment should be immersed in boiling water for 30 seconds. Utensils should be air dried and special care must be given to such locations as knife handles, crevassed utensils and pan corners.

Proper cooking might be termed the most effective method of preventing food poisoning if it were not for the ever present spector of the toxin producing bacteria.

Certain specific procedures may be instigated for safety in disaster feeding. All food items which are mixtures of foodstuffs should be cooked to a point where steam is generated in the center of a product. All meat items should be cooked well done with no exceptions. When mixed salads must be used, all items should be kept under refrigeration until just before use, then quickly mixed and served.

Commercial mayonnaise, by itself, is a safe product. Its mixture with other food should be done only immediately prior to servings. After serving the remainder of the food should be discarded.

The feeding of raw foods is to be discouraged. If necessity demands their usage they must be carefully soaked and washed in water purified as recommended in the water purification section.

Use only those foods which are deemed safe.

Prepare foods as close to the time of serving as possible and maintain heat during the serving period. Under no circumstances should food be allowed to stand at temperatures of 50°-110°F. for more than four hours. If circumstances are such that foods must remain at room temperatures for longer periods, keep hot, keep covered.

Personal hygiene is a must. Most bacteria which cause food poisoning are planted by the people handling food. Hands must not only be cleaned with hot soapy water, but a brush should be used for fingernails and inaccessible regions.

Clothing which fits well and has a minimum amount of folds and wrinkles should be worn. Light clothing is therefore more suitable. Keep clothes clean. Other good hygienic practices are:

Don't sneeze, cough or even talk directly into food; don't work around food if you are sick; always wash hands after using the latrine; don't handle food unnecessarily; keep your hands out of open food containers; don't allow food to come into contact with any part of the body or body's clothing; don't taste food with fingers.

Insect and rodent control must be maintained. Stored food should be kept rat and fly proof. Foods which exhibit rat or insect damage will not be used. They will be removed from the storage area.

By depriving rats and insects of food, you discourage their "moving in".

REVIEW OF THE CONTROL OF FOOD POISONING IN DISASTER FEEDING

The following list are the foods that have been incriminated in outbreaks of food toxications over a period of ten years. They are listed in order of their numerical order of reportable cases. This in no way gives an accurate picture of all foods which may support the active growth of the toxin producing bacteria. Most cases are unreported or inconclusive in the findings of specific causes.

FOOD TOXICATIONS

Cream fillings
Roasted or boiled cured ham and tongue
Meat, fish and poultry salads/prepared with mayonnaise
Milk, raw or unpasteurized
Ice cream
Gravies
Gelatin and mixtures of food with gelatin
Hollandaise sauce
Bread pudding
Beef and pork brains
Cheese
Dried beef
Liver sausage
Foods which are mixtures of cooked foods
Potato salad

The following list contains the foods which have been incriminated in outbreaks of food infections over a period of ten years. They are listed in order of their numerical order of reportable cases. Again, this in no way gives the true picture for any food in this case under certain conditions might support the active growth of these organisms.

FOOD INFECTIONS

Meat and poultry stuffings
Bread puddings
Powdered eggs
Beef gravies
Hamburgers
Meat loaves
Sausage
Puddings
Milk and milk products
Various meats and poultry

NOTE: The majority of reportable cases have shown two specific factors. First, animals of uninspected origin including eggs and milk have been shown as causative agents because most animals are natural carriers and reservoirs of infectious organisms. Secondly, fecal contamination from insects, rodents and man account for implantation of infectious organisms to food through insanitary practices when handling food.

A food is only as safe as the control which is exercised over its source, transportation, processing, cooking, refrigeration and handling. In disaster feeding situations the following foods are considered to be the least dangerous from all aspects.

Canned meats, fish and poultry
Canned milk or powdered milk
Canned and packaged staples
Canned fruit juices
Canned fruits and vegetables
Dehydrated foods
Packaged biscuits, cookies and crackers

Although quite rare, instances of food poisoning from cans have been reported over a period of years. In the majority of these cases (86%) the foods have been home canned or jarred and underprocessed. Certain foods are naturally more susceptible to destruction in preservation and are listed in that order.

Vegetables

String beans
Corn
Beets
Spinach and chard
Asparagus
Olives
Peas
Figs
Beet greens
Beans
Chili Peppers
Mushrooms

Meats

Sausage
Ham (deviled ham)
Beef
Chicken
Blood Sausage
Pork products

Milk (Products)

Cheese and cottage cheese
Milk canned

Fish and Seafoods

Salmon
Tuna
Clams (clam juice)
Sardines
Crab

Miscellaneous

Antipasto
Home brew
Mustard Salad dressing

Carefully inspect all subsistence on arrival to eliminate this as a method of cockroach infestation.

Dirty floors, food crumbs, untidy storage provides all the necessary requirements and basic needs for flies, cockroaches and rats.

Keep garbage in tightly fitted, rat proof garbage cans in a screened area. The freedom of insects in the mess could well depend on the completeness of the garbage area. Garbage areas should be at least 100 feet from cooking areas.

It is assumed that under disaster feeding conditions all normal facilities are not always adequate. There is no *sure* method of eliminating food poisoning, no panacea to meet any eventuality. However, if it does happen, we must ascertain the cause if possible.

The bacteriological analysis of food in the determination of food poisoning is difficult. The best clues are samples of food. Therefore, a recommendation is to take a minute quantity of each food after serving, store it either in ice or refrigeration and hold for 48 hours. If no illness manifests itself in this time food may be destroyed. In case of food outbreak, notify the medical authorities immediately.

In the event of atomic warfare any food not in cans, jars, cartons and other food packages that have not been broken or punctured should be monitored by civil defense radiological teams to be sure that it is sufficiently free of radioactive contamination to permit consumption. In addition it would be well to wipe or wash carefully any can, bottle, or other container that had been exposed to radioactive mist or dust.

Radioactive dust on cooking or eating utensils is another problem. Such dust cannot be made harmless by boiling or by the use of soap and water. The particles can be washed or wiped away, but that does not render them harmless. They are still radioactive and will remain on the cleaning cloth or in the soap suds or washing water. Tubs or pails used for washing cooking utensils after an A-bomb blast should be emptied and rinsed away from the kitchen area and in an area where the water will not drain into and contaminate the water supply.

CHECK LIST FOR SANITATION OF EMERGENCY KITCHENS

CHECK
YES NO

1. HEALTH OF FOOD HANDLERS

a. Is the cook free from any signs of infectious diseases, such as boils, pimples, rash, open sores, diarrhea, heavy colds, weakness? ______________

b. Are his/her hands free from cuts, sores, burns or other skin lesions? ______________

2. CLEANLINESS OF STAFF

a. Are clean washable uniforms or clothing worn? ______________

b. Are hands washed frequently and thoroughly, always after visiting toilet? ______________

c. Are fingernails kept clean and short? ______________

d. Is food handler clean? Are hygienic standards achieved? ______________

3. CONDITION OF KITCHEN, DINING AREA AND STORAGE SPACE (IF APPLICABLE)

a. Is there good ventilation? ______________

b. Are doors and windows of building properly screened? ______________

c. Is there adequate lighting? ______________

d. Is the outside area kept clean, free from debris and harborage? ______________

e. Are the floors kept clean? If they are dirt floors are they raked daily and kept dry? ______________

f. Are the work tables, serving counters and shelves kept clean and dry? ______________

g. Is the refrigeration equipment kept clean and the food stored properly? ______________

h. Are the utensils and food supplies easily accessible for inspection of damage? ______________

4. COOKING AND EATING UTENSILS

a. Are utensils thoroughly washed, scalded, air dried and put away in a clean place after each meal? ______________

b. Are the utensils free from dust or kept covered between meals? ______________

c. Are they free from cracks and crevices and easily cleaned? ______________

5. WATER SUPPLY

a. Has the water supply been approved by proper authorities? ______________

b. Is the water supply accessible to the kitchen? ______________

c. Is hot water available for washing and scalding of utensils (180° F. to 212° F.)? ______________

CHECK
YES NO

6. PROTECTION OF FOOD SUPPLIES

a. Are foods protected from dust, flies, rodents, vermin and other sources of contamination? ______________

b. Are food supplies covered? ______________

c. Are food supplies handled in a sanitary manner? ______________

d. Is there any evidence of paint, chemicals, insecticides, etc. stored near food? ______________

7. DISPOSAL OF GARBAGE AND REFUSE

a. Are garbage cans free from leaks? Do they have tightly fitting lids? ______________

b. Are garbage and waste materials removed from the area daily and disposed of in an approved manner? ______________

8. WASHING FACILITIES

a. Are there facilities provided for washing hands? ______________

b. Are soap and sanitary towels provided? (Paper towels preferred) ______________

9. TOILETS, STANDARD OR IMPROVISED

a. Are they properly located, constructed and maintained in a sanitary manner? ______________

10. ACCIDENT HAZARDS

a. Are inflammable materials stored properly and away from fires? ______________

b. Is care exercised in handling hot liquids and foods? ______________

c. Is space provided for safe storage of sharp knives? ______________

11. FIRST AID EQUIPMENT

a. Is a first aid kit easily accessible? ______________

12. FIRE FIGHTING EQUIPMENT

a. Is fire fighting equipment provided and easily accessible? (Fire extinguishers, sand boxes, shovels, etc.) ______________

REMARKS

LESSON PLAN

PAGE 1
OF 4 PAGES

COURSE Disaster Feeding	SUB-COURSE		
UNIT OF INSTRUCTION Mess Layout for Mass Feeding		Schedule No.	No. of Hours 35 minutes

SCOPE

Rules and factors for consideration in selecting a kitchen site; principles of arranging the cooking facilities, the progress construction of expedients each day.

OBJECTIVES

To have the student attain:

1. An understanding of principles to be considered in the selection of a kitchen site.
2. An understanding of the principles of locating and arranging the kitchen site.
3. The sequence in which the equipment will be constructed by days.

REFERENCES

TM 10-405, The Army Cook, Aug 1945

STUDY ASSIGNMENT

None

TEACHING AIDS

Models

Blackboards

QMTC 29

LESSON PLAN (CONTINUATION SHEET)

PAGE 2 OF 4 PAGES

CODE NUMBER

3 min L, C I. INTRODUCTION

A. Selecting the emergency kitchen site.

1. The importance of a proper type kitchen site cannot be overemphasized.

a. When disaster strikes, the assumption presented is that normal eating facilities will not be available.

b. Methods of preparing and serving food must be considered intelligently. Certain rules must be followed.

2. The models used are to scale so there will be an accurate representation.

B. Objectives of this unit of instruction are to have the student attain:

1. An understanding of principles to be considered in the selection of a kitchen site.

2. An understanding of the principles of locating and arranging the kitchen site.

3. The sequence in which the equipment will be constructed by days.

25 min L, C II. PRESENTATION

A. The principles listed below are tried and proven by military operations in combat areas. With slight changes they will apply equally as well to this emergency situation.

1. Level, Self Draining Ground.

a. Should be slightly elevated.

b. Of the type earth that absorbs moisture.

2. Convenient to Diners.

a. Feeding site should be as near to the people who are to be fed as possible.

b. It should be as non-complex as possible and comfort of the feeders should be considered to a relative extent.

3. Accessible to Roads.

a. Necessary to receive equipment and supplies.

b. Roads should be in good condition so that necessary items can reach the site with as much ease and speed as possible.

LESSON PLAN
(CONTINUATION SHEET)

PAGE 3 OF 4 PAGES

CODE NUMBER

4. Sanitary Area.

a. Too much shrubbery, trees, etc., will provide harborage for insects and rodents who carry dirt and disease. Most of this foliage should be cleared from the area around the feeding site.

b. Your larger trees provide shade so they will usually be all right if not too many in number.

c. Providing adequate sanitation is the principle or factor concerning proper drainage. Poor drainage fosters disease.

5. Equipment and Arrangement

a. Much of the equipment will be of an improvised nature.

b. The following facilities will be needed:

(1) Cross trench pre-dip sterilization.
(2) Open fire cooking and heating facility.
(3) Cross trench washing facility.
(4) Cross trench barrel oven.
(5) Soakage pit grease traps.
(6) Griddle.
(7) Triple barrel utensil, washing and sterilizing.
(8) Deep pit latrine.

Blackboard

c. Equipment should be arranged similar to a cafeteria line.

(1) Section for pre-eating utensil sterilization.
(2) Section for cooking facilities.
(3) Section for serving.
(4) Section for consumption of meal.
  (a) This should be at the end of the line.
  (b) No cross traffic (lines crossing) should be allowed.
(5) A section for garbage disposal should be set up at least 100 yards from the feeding section. Then a final section, the washing section should be set up.
(6) The pit latrine must be situated at least 100 yards from the kitchen site.

6. Personnel

a. The number of personnel needed will depend on the number of people to be fed.

b. Supervisors and workers.

c. All personnel should be inspected to insure that they are not carriers of disease, that they don't have pimples, boils, etc., in an excess that would prove dangerous to a feeding situation and that their knowledge of food handling is matched by their knowledge of hygiene.

7. Utilities

a. It is presumed that gas, electricity and water will not be available through normal channels. Thus, it is necessary for some improvision. Simply constructed lighting torches can be made from salvage material that will normally be available. In the use of these expedients, light flame must be protected from high winds.

b. Water storage is, of course, necessary near a kitchen area. This means a purification system will have to be set up.

2 min L, C c. Safety precautions should be especially watched during a haphazard operation of this type.

5 Min L, C III. SUMMARY

A. Proper layout and selection of kitchen site is of paramount importance in any feeding situation.

B. Our job is to feed people. The selection of the kitchen site and the way it is set up will greatly influence our ability to do a good job.

IV. STANDBY MATERIAL

A. Review the rules of lay-out and arrangement of a field kitchen-site.

B. Review the construction problems and techniques of developing the field expedients.

MANUSCRIPT

SELECTING THE SITE

When and if a disaster strikes, we will not have a modern cafeteria around the corner to go to for food. Therefore, it becomes necessary to think of the future and plan a method of preparing and serving food. An area or site must be chosen, with certain circumstances being considered, for the feeding of groups of people.

There are many problems that are encountered in choosing a site. Through actual experience we have developed seven rules or principles that should be followed in the setting up of a kitchen site.

1. Level, Self Draining Ground.

The kitchen should be level in order to facilitate ease of movement for cooks and food handlers. This will also be helpful in eliminating any accidents that are likely to occur when these workers carry heavy kettles and improvised stock pots over bumpy ground. Natural drainage should also be kept in mind for it is important to keep the kitchen area dry for sanitation reasons and, again, for the facilitation of movement. A sandy, loam type of site is best for water absorption. Hard clay is not desirable, because it becomes slippery and tends to hold water. Black muck or jumbo type ground becomes soft and bottomless and because of this, should be avoided.

2. Convenient to Diners.

Many of the people that are to be fed may have difficulty in moving about because of injuries, age, etc. The distance should not be more than 15 minutes walking distance (approx. ¼ mile) for a normal person.

3. Accessible Roads.

Thought should also be given to the heavy supplies that must be delivered to the kitchen from storage areas. It may be necessary to transport these items by large vehicles or hand carts. The roads should also be convenient for transporting certain patrons to and from the kitchen site.

4. Sanitary Area.

The situation will require extreme care to preserve sanitation. Stagnant ponds or streams are infested with insects and should be avoided. Open or broken sewerage is ideal harborage for rodents and must be avoided. Insects and rodent infestation can cause serious outbreaks of sickness.

The presence of trees for shade is desirable, but thick shrub brush and growth restrict freedom of movement for all personnel and hampers efficient feeding.

5. Equipment Arrangement.

The equipment should be constructed in a planned sequence. The first day construction should provide only the required equipment. Thereafter improvements should be made as conditions permitted.

A recommended construction guide follows:

1st Day.

a. Cross trench pre-dip sterilization.
b. Open fire cooking & heating facility.
c. Cross trench washing facility.

2nd Day. First day's facilities plus:

a. Cross trench barrel oven.
b. Soakage pit & grease trap.
c. Incinerator (horizontal & verticle barrel).
d. Griddle.

3rd Day.

a. Triple barrel utensil washing facility.
b. Griddle & one barrel oven.
c. Double barrel oven.

The equipment should be arranged similar to a cafeteria. First, a means of pre-dipping eating utensils, then the griddle tops (can be used for hot top) so that the service can be direct from the griddles. Next comes the ovens with the opening facing the cooking area away from the line. Another line of equipment can be arranged parallel and opposite the ovens and griddles at least 10 feet away. This equipment arrangement is used in the attached diagram. For safety and convenience of the cooks, a minimum of six feet between each open fire should be allowed. The end of the serving line should lead into the dining area. After the patrons have eaten, they leave the dining area without crossing the serving line and proceed to the utensil and washing facility.

A garbage disposal can should be placed in front of the utensil washing facility. This will be emptied after each meal and placed in the incinerator provided.

The facilities for washing the diners utensils should be placed at the outer edge of the dining area, leading away from the kitchen site. The patrons clean and maintain their own eating utensils and bring them to meals.

The number of diners should be limited to 500 in any one kitchen with provisions made for the dining area to accommodate at least half that number.

The soakage pit and grease trap should be approximately 25 feet from the cooking area. The location should be on the opposite side of the cooking area from the dining area.

The kitchen layout can be altered, provided one principle is constant. Keep a straight line flow through the serving line into the dining area and then to the washing area and the exit. Never rearrange to cause cross line traffic, because this can easily cause confusion and thus delay serving.

6. Personnel.

The number of personnel required to maintain each feeding station will, of necessity, depend on the number of people being fed at that station. Assuming that the maximum (500) are being fed three meals per day they would require:

a. Supervisor and Co-Ordinator. One (1).

b. Cooks. Three (3). Actually preparing and serving food.

c. Cooks Assistants. Four (4) Assists cooks, deliver food, water, etc.

d. Assistant to Supervisor. One (1) per line. Required only at meal or serving time to direct traffic, etc.

7. Utilities.

It is assumed that gas, electricity and water will not be available through regular facilities. Improvised lighting will be a necessity. This can be accomplished by means of home made candles or through the use of sand or rag saturated with oil or gasoline. Pine knots can also be used for this purpose. As mentioned in a previous hour, potable water available for use at the kitchen site is a must.

LESSON PLAN

PAGE 1
OF 4 PAGES

COURSE Disaster Feeding	SUB-COURSE

UNIT OF INSTRUCTION Foods to Serve	Schedule No.	No. of Hours 15 minutes

SCOPE

To acquaint the students with the types of Food Items to use with emergency field expedients.

OBJECTIVES

To have the student attain:

1. An appreciation of the type of food dishes to serve under emergency conditions using field expedients.
2. An understanding of special feeding problems following a disaster.

REFERENCES

TM 10-405, The Army Cook, Aug 1945
QMS 163.1T, Applied Cookery Workbook, 1951
QMS 168.W, Nutrition & Menu Planning Workbook, 1951

STUDY ASSIGNMENT

TEACHING AIDS

QMTC 29

LESSON PLAN (CONTINUATION SHEET)

PAGE 2 OF 4 PAGES

CODE NUMBER

3 min L, C

I. INTRODUCTION

A. Motivation: The crude improvised equipment is more adaptable to simple menus. The selection of menu items is important because of:

1. Limited Cooking Facilities.
2. Strange cooking utensils.
3. Limited types of food which may be available.
4. Necessity for a nutritionally adequate and balanced diet.

B. The objectives of this unit of instruction are to have the student attain:

1. An appreciation of the type of dishes to prepare under emergency conditions, using crude, improvised field cooking expedients.

2. An understanding of the special feeding problems which may be encountered following a disaster.

10 min L, C

II. PRESENTATION

A. Types of foods to serve.

1. Should be simple to prepare and nutritious.

Ref: TM 10-405, General
QMS 163.1T
QMS 168.1T
General

a. These require a minimum of processing and handling of food therefore, reduce contamination.

b. The dishes should not require a great deal of skill to prepare.

c. Use Moist Heat Cooking Method, using open kettle over direct heat.

d. The liquid and juices of any canned food will be used as the cooking liquid. Additional purified water may be used if necessary.

e. All canned foods will be transfer rinsed (liquid poured from can to can) to extract all food particles.

Time methods Aids.
Ref: TM 10-405, General

f. All cooking juices should be thickened near the end of the cooking process in order to be served with solid foods. Thickened juices will cling to solid foods and give added nutritive value. Patrons will consume a medium thick sauce but will tend to discard unthickened juices.

2. Retain original cooking liquids from paste products and legumes (noodles, rice, beans) for further use.

a. We may sacrifice palatability in order to gain added food value.

b. The scarcity of water and the need for retaining water soluble vitamins make this practice necessary.

QMTC 29a

LESSON PLAN
(CONTINUATION SHEET)

PAGE 3 OF 4 PAGES

CODE NUMBER

3. Hot Beverages:

Ref: TM 10-405, General
QMS 163.1T
QMS 168.W
General

a. These are simple to prepare and are highly acceptable.

b. They provide some relief from initial shock and aid in reducing nervous tension.

c. Their stimulating qualities will improve morale and increase comfort of disaster victims.

d. Use open kettle method of preparation for coffee and tea. Sprinkle grounds or leaves over boiling water, reduce heat and allow to steep for 10 minutes, then sprinkle a small amount of cold water on surface to settle grounds or leaves and the beverage is ready to serve.

Time Methods Aids Ref.

e. Hot cocoa and hot milk are both stimulating and nutritious. They are especially desirable for small children and pregnant women.

4. Cooked Cereals.

a. They are simple to prepare, satisfying and nutritious.

b. They should contain enough cooking liquid that they are not served firm and dry.

5. The Construction of Griddles and Ovens will allow the cook to add variety to the menu.

a. Chemical leavened quick breads may be produced. Hot biscuits, corn bread or crisp spoon muffins are a few examples.

b. Other baked dishes such as potatoes, beans and macaroni and cheese are a few examples of palatable and nutritious items, which can easily be prepared in improvised ovens.

c. Improvised griddles allow us to prepare fried items such as meat, fish and vegetables. These add variety to the diet as well as nutritive value.

2 min L, C
Ref: TM 10-405, General

B. Bread and other yeast leavened products have been intentionally omitted. Reasons are:

1. The lack of necessary equipment.

2. Time required in preparation and the great amount of handling, allow too great a possibility for contamination of the product.

3 min L, C
TM 10-405
General

C. Feeding of Children.

1. If a large number of infants and young children, (1-18 months) must be fed, it may be desirable to set up separate kitchens for this purpose.

2. Menus should include fruit juices, puree of vegetable soups, mashed and unseasoned vegetables and milk.

LESSON PLAN
(CONTINUATION SHEET)

PAGE 4 OF 4 PAGES

CODE NUMBER

2 min L, C

III. SUMMARY

A. Review of various practices.

1. Serve simple one kettle meals which are nutritious.
2. Minimize food handling.
3. Thicken and serve all cooking liquids.
4. Include hot beverages with each meal.
5. Add quick bread and baked dishes as soon as conditions permit.
6. Serve hot cooked cereals.
7. Feeding of children requires special attention.

B. Questions by students.

IV. STANDBY MATERIAL

A. Nutritional factors to be considered in this feeding.

B. More detail on griddles.

QMTC 29a

MANUSCRIPT

PREPARATION AND SERVICE OF FOOD

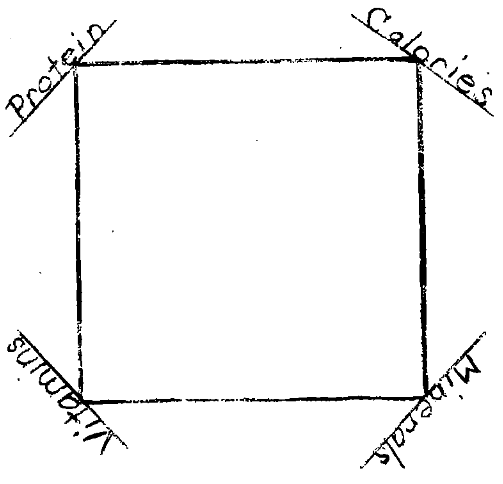
Simplicity of preparation and service of food is an absolute must in emergency mass feeding. Confusion will reign. Lack of organization can be expected. Shock may cause weakness and inertia. Personnel will, in the majority of cases, lack experience in improvising to meet feeding requirements.

Preparation of hot food should be limited to items which require no pre-preparation and lend themselves to cooking in a single pot. Canned foods meet these requirements. However, we do not mean to imply that emergency mass feeding is a "soup line" affair.

For obvious reasons we must continue to be nutrition conscious. Many persons lose sight of nutrition during times of emergency due to the fact that the desired food service equipment, personnel and subsistence are not as available as we have been accustomed to.

In this connection, no matter how humble our circumstances might be, it is possible to be nutrition wise. Under emergency conditions it becomes necessary to think in terms of nutrition as a "square meal".

Exactly what do we mean by a square meal. The sketch below will illustrate.



If the meals we plan contain the nutrients outlined on this sketch, we have a "square meal".

Under these conditions, it can be assumed that those being fed will not suffer from malnutrition.

One kettle dishes can be nutritious and acceptable if care is exercised in the selection of the food items to be used. Of course the manner of serving will effect the acceptability of one-kettle dishes.

For the most part, the actual food items requiring cooking will be accomplished by the moist methods of cooking. For example, open kettles over direct and improvised steaming will be used.

The juices of all canned and cooked vegetables can be used to advantage on one-kettle cooked dishes. All canned foods that are opened must be transfer-rinsed to extract all food particles and juices which can also be used. Toward the end of the cooking period, all juices should be thickened with any available thickening agent, prior to being served with solid foods. These juices are concentrations of valuable nutrients that are required by the body.

Normally we are very conscious of the eye appeal of food and its palatability. In striving to obtain eye appeal, we sacrifice food value many times. In this present emergency it will be necessary to reverse the procedure and sacrifice eye appeal slightly in order to retain maximum food value. An example of this is by retaining the original liquids from paste products and legumes, *i.e.*, noodles, rice, beans and using this liquid with the prepared dish. The scarcity of water and the fact that many vitamins are water soluble, makes this mandatory.

Another item that will be desirable and simple to make is a hot beverage. These hot drinks are excellent stimulants for initial shock and aid in reducing nervous tension. The stimulating effect derived from a hot beverage will improve morale and increase the comfort of the persons being fed. The method of preparation should be the same simple open kettle method for coffee, tea and cocoa or hot milk.

As the facilities improve with the introduction of improvised griddles and ovens, we can add grilled and baked dishes. This will be a welcome change in consistency of orm. Hot biscuits, corn bread, crisp spoon muffins or hot cakes are a few examples. Other baked items are potatoes, beans, macaroni or hash. Of course, with the implementation of baked food dishes, we could also have a soup, chowder or gumbo to accompany this meal. The omission of bread and yeast leavened products is intentional. The reason for this is the lack of special equipment that would be required. Time required for fermentation is a second consideration and the tremendous handling would increase possibilities of food infection.

By using the griddles, we can add rush dishes as fried meats, potatoes, noodles or thin breads. This also would enable the use of frying in fat to increase food value, use of leftover fats and a change in the type of food preparation.

Cooked hot cereals are excellent to serve for breakfast. It's a simple dish to prepare and is a very filling and sustaining food item. Simplicity in serving increases the desirability of this item. These dishes should be prepared quite moist and not cooked firm and dry.

Retention of usable material.

Any material that is received by the kitchen site should be cleaned and retained for use. Food tins should be cleaned and used to make eating utensils, smoke stacks, food choppers, etc. Cardboard makes fine insulating material and wire or steel banding can be used for stack supports as well as supporting improvised ovens.

CHILDREN FEEDING.

Supervision of the field kitchen will require some thought to child or infant feeding. Fruit juices, puree of vegetable soups, mashed unseasoned vegetables and milk for each meal will probably be mandatory. If the number of infants and young children (1 to 18 months) is quite a considerable number, then it is advisable to establish separate infant kitchens.

LESSON PLAN	PAGE 1 OF 4 PAGES

COURSE	SUB-COURSE

UNIT OF INSTRUCTION Field Expedients	Schedule No.	No. of Hours 3

SCOPE

Field expedients for mass feeding under disaster conditions; to include, individual utensils, cooking utensils, and cooking facilities for groups of 100 to 500 persons.

OBJECTIVES

To have the student attain:

1. An understanding of some of the types of field expedients.
2. An understanding of the construction of some field expedients.

REFERENCES

TM 10-405, The Army Cook, Aug. 1945

STUDY ASSIGNMENT

TM 10-405 par. 234c
Student Handout

TEACHING AIDS

Field expedient area.
Charts I-XXIII

QMTC 29

LESSON PLAN
(CONTINUATION SHEET)

PAGE 2 OF 4 PAGES
CODE NUMBER

5 min L, C — I. INTRODUCTION

A. Motivation.

1. Expedients come into being when all conventional type cooking facilities and utilities have been destroyed or denied us.

2. Expedients are many in number and vary in manner of construction. It is left up to the imagination and ingenuity of the person or persons involved.

3. In the initial stages of feeding, immediately following the disaster, the expedients made will necessarily be simple so as to cook the food. However, as time passes, the expedients must be developed to meet the requirements.

B. The objectives of this unit of instruction are to have the student attain:

1. An understanding of some of the types of field expedients.
2. An understanding of the construction of some field expedients.

Ref: TM 10-405, Gen. — II. PRESENTATION

A. Construction, utilization, and operation of:

5 min — 1. Chart II, Cross Fire Trench.
5 min — 2. Chart V, Barrel Oven over Cross Trench.
5 min — 3. Chart IV, Griddle & Quick Bread Oven.
5 min — 4. Chart I, Water Heater & Cooking Facility.
5 min — 5. Chart VI, Combination Hot Plate & Oven.
5 min — 6. Chart VII, Double Barrel Oven with Griddle.
5 min — 7. Chart III, Trombone Heater.
5 min — 8. Chart VIII, Washing and Sterilizing Unit.
5 min — 9. Chart XXIV, Grease Trap and Soakage Pit.
5 min — 10. Chart XXV, a Deep Pit Latrine.
5 min — 11. Chart XXVI, Canned Wax Torch.
5 min — 12. Chart XXVII, Shallow Pan Torch.
5 min — 13. Chart XXVIII, Bottle Torch.
5 min — 14. Chart XXIX, Reflector Lamp.

5 min — III. SUMMARY

A. You have seen here the construction, capabilities, requirements and operation of some semi-permanent field expedients ranging from the simple to the complex.

B. Not all of these expedients would be necessary to build for one kitchen area for groups of 100 to 500 persons.

C. Ask for questions.

LESSON PLAN
(CONTINUATION SHEET)

PAGE 3 OF 4 PAGES

CODE NUMBER

	2nd and 3rd Hours
5 min L, C	I. INTRODUCTION
	A. During this period you will be shown how to make cooking and serving utensils.
	B. The class will be divided into groups of not more than five students in order to facilitate the practical work to be assigned.
TM 10-405 Gen. PE	II. PRESENTATION
	A. Assistant instructors explain and demonstrate.
5 min	1. Chart IX, Serving Spoon.
5 min	2. Chart X, Serving Spatula.
5 min	3. Chart XI, Scoop.
5 min	4. Chart XII, Serving Tongs.
5 min	5. Chart XIII, Wooden Spatula.
5 min	6. Chart XIV, Dippers or Ladles (dem. only one dipper or ladle).
5 min	7. Chart XV, Cooking Vessels.
5 min	8. Chart XVI, Cooking Vessels (cont.).
5 min	9. Chart XVII, Serving Surface.
	END 2nd HOUR
	THIRD HOUR
	B. Continuing with explanation and demonstration of the various field feeding expedients.
5 min	1. Chart XVIII, Hot Food Containers.
5 min	2. Chart XIX, "A" Frame Transport.
5 min	3. Chart XX, #10 Can Plate or Bowl.
5 min	4. Chart XXI, Cup.
5 min	5. Chart XXII, Fruit or Dessert Dish.
5 min	6. Chart XXIII, Eating Spoon.
5 min	7. Chart XXIV, Grease Trap and Soakage Pit.
5 min	8. Chart XXV, Deep Pit Latrine.
5 min	9. Chart XXVI, Canned Wax Torch.
5 min	10. Chart XXVII, Shallow Pan Torch.
5 min	11. Chart XXVIII, Bottle Torch.
5 min	12. Chart XXIX, Reflector Lamp.

QMTC 29a

LESSON PLAN
(CONTINUATION SHEET)

PAGE 4 OF 4 PAGES

CODE NUMBER

15 min C. Assemble Class at model kitchen area and demonstrate food prepared in:

1. Combination Hot Plate and Oven—Baked Beans.
2. Griddle and Quick Bread Oven—Corned Bread.
3. Barrel Oven over cross trench—Biscuits.
4. Combination Hot Plate & Oven—Steaks.
5. Water Heater & Cooking Facility—Hot Beverage.

III. SUMMARY

5 min L, C A. Questions by instructor on various expedients constructed during the hour.

B. Questions by students.

LESSON PLAN			PAGE 1 OF 3 PAGES
COURSE	SUB-COURSE		
UNIT OF INSTRUCTION Group Performance		Schedule No.	No. of Hours 4

SCOPE

Practical exercise on Field expedients for mass feeding under disaster conditions: to include, individual utensils, cooking utensils, and cooking facilities for groups of 100 to 500 persons.

OBJECTIVES

To have the student attain a:

1. Working knowledge of construction of expedients.
2. Working knowledge of layout of a field expedient kitchen area.
3. Working knowledge of the operation of field expedients constructed.

REFERENCES

TM 10-405, The Army Cook, Aug 1945

STUDY ASSIGNMENT

TM 10-405 Par 234c
Student Handout

TEACHING AIDS

Field Expedient Area
Charts I—XXIII

QMTC 29

LESSON PLAN
(CONTINUATION SHEET)

PAGE 2 OF 3 PAGES

CODE NUMBER

5 min L I. INTRODUCTION

A. Situation

1. Refer to assumption listed in the introduction.

II. PRESENTATION

A. Problem

1. You are to provide messing facilities for 100 people in specified area.

2. Sanitation must be carried out as previously outlined.

3. Source of water supply for this problem is a water trailer.

4. You are limited to the construction of cooking facilities. You may construct:

a. Water Heater and Cooking Facility one (1) each kitchen.

b. Griddle and Quick Bread Oven, one (1) each kitchen.

c. Barrel Oven over Cross Trench, one (1) each kitchen.

5. You will construct cooking and serving utensils and individual utensils, in the amount deemed necessary for your operation.

6. You will construct one (1) deep pit latrine.

10 min B. Split class in half. Assign a group leader for each half and assign areas for each group to work in.

105 min C. One assistant instructor will be assigned each group to supervise the operation of kitchen layout and construction and operation of expedients.

15 min D. Safety Precautions

1. When handling expedients in blackout conditions or semi-darkness, there is always the possibility of someone getting scalded, burned, cut or injured in some way.

2. To avoid injuries, the best precautionary measure is proper supervision and control of the messing area.

a. Do not allow unauthorized personnel to enter the kitchen area.

b. Rigidly control the mess line.

c. Supervise the use of the mess kit laundry.

LESSON PLAN
(CONTINUATION SHEET)

PAGE 3 OF 3 PAGES

CODE NUMBER

3. If possible, put handles on all cooking vessels.

4. Elevate cooking facilities to a height of two or three feet where possible.

5. When lifting heavy cooking vessels, bend knees and lift with the thighs and back bearing the strain, rather than the arms and shoulders only.

6. When cutting tin cans or light sheet metal, care must be taken to avoid being cut by the sharp edges of the metal. Where possible, roll the edges of the completed expedient, otherwise dull the edges by rubbing them on a brick or piece of concrete.

7. All injuries must be immediately treated by medical means. The possibility of infection is always acute under this type of operation because of the possible bacterial inoculation of foodstuffs also.

III. SUMMARY

15 min A. Critique by assistant instructors.

B. Critique of entire class by principal instructor.

LESSON PLAN		PAGE 1 OF 5 PAGES
COURSE Disaster Feeding	SUB-COURSE	
UNIT OF INSTRUCTION Group Performance	Schedule No.	No. of Hours 3

SCOPE

Practical exercise preparing simple menus utilizing emergency field food service expedients; techniques employed in lighting fires and controlling temperatures.

OBJECTIVES

To have the students attain:

1. An understanding of the operation of various emergency food service field expedients.

2. An understanding of food preparation on food service field expedients to include stew type dishes, quick breads and beverages.

REFERENCES

TM 10-405, "The Army Cook", Aug 1945
TM 10-412, "The Army Recipe Book"

STUDY ASSIGNMENT

None

TEACHING AIDS

Food Service Field Expedients; Barrel ovens over cross fire trench; griddle and quick bread oven; water heater and cooking facilities.

QMTC 29

LESSON PLAN (CONTINUATION SHEET)

PAGE 2 OF 5 PAGES

CODE NUMBER

2 min L I. INTRODUCTION

A. Motivation

1. During this period of instruction, you will participate in a practical exercise devoted to the preparation of simple menus utilizing the emergency field Food Service expedients that you constructed this morning. The construction of the field expedients represents only one phase of the problems involved in disaster feeding. An understanding of the operation of these expedients in the actual preparation of food items is required as well as the objective of this block of instruction.

2. The products that you will prepare during this practical exercise are canned beef stew, baked biscuits or corn bread and hot coffee. The preparation of these products will be made, utilizing the open fire heater for the stew dish and the improvised ovens for the baked products.

B. Objectives of this unit of instruction are to have the students attain:

1. An understanding of the operation of various emergency Food Service field expedients.

2. An understanding of food preparation on Food Service field expedients to include stew type dishes, quick breads and beverages.

10 min PE II. PRESENTATION

A. Water purification

1. Choose one of the following as your source of water supply. (See Lesson Plan on Water Purification)
   a. Public water system.
   b. Springs and wells.
   c. Rivers, streams, lakes and ponds.

2. Store water in:
   a. Salvage oil drums.
   b. Salvage bath tub.
   c. Tarpaulin—lined pits.

3. Methods of purifying water—(See Lesson Plan on Water Purification)
   a. Class will be divided into two groups.
   b. Each Group will purify enough water for 100 people. (200 gallons).
   c. One group will purify water by boiling.
   d. One group will purify water by using laundry bleach.
   e. Groups will then be rotated and each will be given the opportunity to purify water by the other means as outlined above.

LESSON PLAN
(CONTINUATION SHEET)

PAGE 3 OF 5 PAGES

CODE NUMBER

10 min PE — B. Preparing the fire and preheating the expedients to be used.

1. Line the fire pit base with crumbled paper and ignite.

2. Place small pieces of kindling on the lighted paper and continue to add large pieces of wood as they ignite and are assured of burning.

3. Spread the burning wood and hot ashes over the entire length of the fire pit. Place one or two new logs on the hot ashes. Close the fire pit (feed) opening except for a two inch slit along the entire base. Adjust the opening along the base (larger or smaller) to control the draft. A steady flow of smoke and gas should emerse from the stack.

   a. Another method of making a fire would be to:

      (1) Select siding from salvage buildings, preferable boards that show above average pitch content.
      (2) Break into lengths of fire pit.
      (3) Shave hack thin half-curls one half the length of the board. Be careful not to break the curls off.
      (4) Place several shaved sticks, curl down, on support in the center of the fire pit.
      (5) Apply match or other lighting means to center of curl portion of stick.
      (6) When the main body of the curled stick becomes ignited, add additional light wood in criss-cross fashion.
      (7) When additional wood is burning brightly, add heavier wood.
      (8) Precautions:
         (a) Never use gasoline, oil, grease or other inflammable liquid in starting a fire.
         (b) Protect your wood supply from the elements as much as possible.
         (c) A more efficient fire and cooking temperature can be maintained by firing often with a small amount of fuel.

63 min PE — C. Preparing the Stew:

1. Presoak the dehydrated onion.

2. Preheat opened cans, meat and gravy. Pour gravy from the meat into the large cooking container.

LESSON PLAN (CONTINUATION SHEET)

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CODE NUMBER

3. Open canned vegetables and empty juice into large cooking kettle, retaining vegetables until later.

4. Add celery, onions w/liquid and any other raw ingredients into the large kettle, adding water as needed. Simmer 40 minutes.

5. Add meat, all other vegetables and seasoning. Continue to simmer until all added ingredients are hot (about 30 min).

6. Mix flour and water to form a thin pouring paste. Slowly add the flour paste into the large kettle, mixing around the surface of the liquid to avoid mashing vegetables. With a lifting motion, completely mix the ingredients a few times with a wooden spatula. Stir occasionally, simmer for 25 minutes and serve.

NOTE—Reference is made to form changes on rest of lesson plan.

15 min L, PE — D. Prepare the Beverage.

1. Measure seven gallons of purified clean water into a pot (for 100 servings).

TM 10-405, General — 2. Bring water to boiling point.

3. Sprinkle 3 lb. (or three heaping qts.) of ground coffee on surface of the water. Ladle the water over grounds to wet completely.

4. Move pot away from the direct heat to prevent further boiling. Brew in this manner for about ten minutes.

5. Sprinkle one quart of cold water around the surface to settle the grounds. Serve immediately.

10 min L, PE — E. Preparing hot biscuits: (One half of the group will prepare biscuits and the other half will prepare baked corn bread).

1. Sift or thoroughly mix the flour, baking powder and salt.

2. Add small pieces of shortening and blend.

3. Add milk, mix just enough to combine (should appear lumpy).

4. Roll and cut out with a milk can or press flat and cut into two inch squares.

5. Place on sheet pan one-half inch apart.

6. Place in hot (415° F.) oven and bake 15 minutes.

LESSON PLAN
(CONTINUATION SHEET)

PAGE 5 OF 5 PAGES
CODE NUMBER

F. Preparing Corn Bread:

1. Sift or thoroughly mix together corn meal, flour, baking powder, and salt.

2. Beat and add eggs. Add milk and melted or soft shortening.

3. Stir just enough to moisten.

4. Pour onto greased pan or sheet.

5. Bake in hot oven (400°) 30 minutes. (Hand-count method will be explained).

20 min PE TM 10-405 — G. Serving and Tasting Food:

1. Arrange the prepared food on improvised serving counter and serve students.

   a. Demonstrate the proper technique of serving.

   b. Demonstrate the proper serving portions with the appropriate size serving utensil.

10 min PE TM 10-405 — H. Cleaning utensils and equipment:

1. Clean ashes from the stove and clean off cooking surfaces.
2. Wash all utensils and return to storage.
3. Return all subsistence to storage.
4. Completely police area and check that all fires are out.

5 min L — III. SUMMARY

A. Review the following points:

1. The sequence of lighting stoves.
2. Means of controlling heat by regulating draft.
3. The simple means of preparing one kettle meals.
4. The methods of mixing and baking quick bread products.

C. By following the principles which have been discussed here and incorporating these with other hours of instruction we will be prepared to accomplish our mission of feeding the stricken populace after the *thing* happened.

IV. STANDBY MATERIAL

A. Questions by instructor.

B. Questions by students.

QMTC 29a

APPENDIX

IMPROVISED EQUIPMENT

FOR

EMERGENCY MASS FEEDING

CHAPTER I

FOREWORD

It is possible that after a disaster groups of individuals will be isolated and will of necessity have to subsist themselves.

Assuming that public utilities are not available and that conventional cooking facilities are lacking, it is up to the group of individuals to improvise equipment in order to prepare their own food.

All equipment shown in this chapter can be made from scrap material normally available in areas where a disaster has struck.

Many foods are received in metal containers that may be put to use for cooking and serving. When a utensil is needed, a tin can, forced into the desired shape, may do the job. The standard tin can is made of sheet metal with a 1.5% tin coating. Never heat the can when it doesn't contain liquid or food because the thin film will crack and burn away. This is a protective coating, and should remain on the can. Some cans are enameled and have a gold colored interior. If these cans are to be used for cooking, this enamel should first be burned off, then the metal should be thoroughly cleaned.

There are no essential tools for tin can improvising. Just use what is available. A can opener, a nail, a jackknife, a screwdriver and tin snips or shears will be useful in working with tin.

Larger and heavier equipment may be made from bricks, concrete blocks, garbage cans, oil drums, sheet metal, steel plates and mud. This equipment will require more time to construct but is essential for group feeding.

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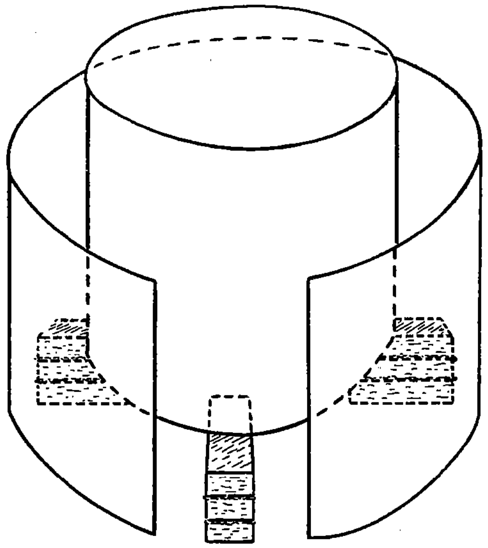
CHART I

WATER HEATER AND COOKING FACILITY



Material Required:
1. Twelve (12) bricks.
2. Half of a 55 gallon drum for a cook pot.
3. One piece of sheet metal 10' x 2'.

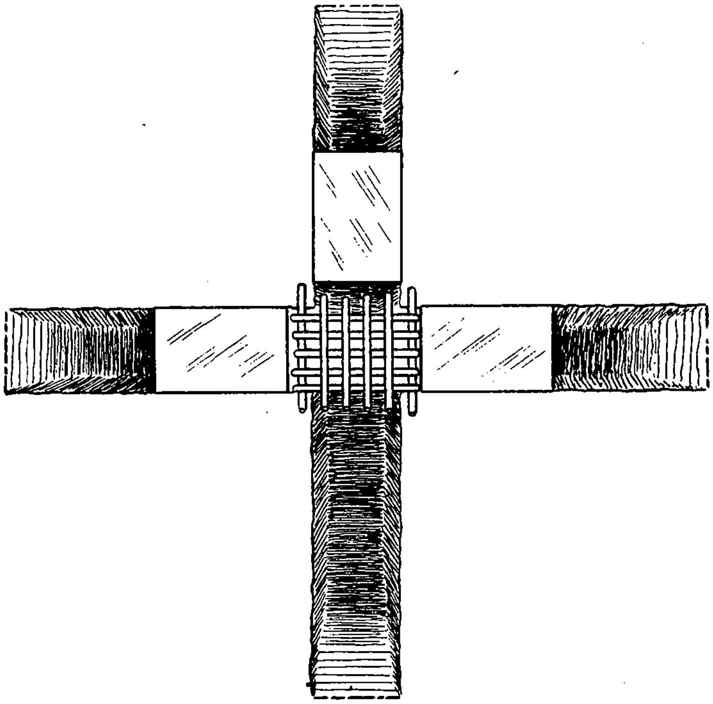
Construction:
1. Outline a rectangle on flat ground 1'6" square.
2. At center of each of 4 sides of square, stack 3 bricks with mortar between. Bricks should be stacked from edge of square outward.
3. Place pot on stacks of bricks.
4. Bend sheet metal to fit around stacks of bricks. Leave a 6 inch space between ends of sheet metal.

Operation:
1. Build wood or coal fire inside ends of stacks of bricks.
2. Place 6 inch space of shield facing the wind.

Requirements:
1. Two per 100 group unit.
2. Six per 500 group unit.

CHART II

CROSS FIRE TRENCH



Material Required:

1. Three (3) pieces of sheet metal 1½' x 1'.
2. Ten (10) pieces of scrap iron such as pipe, angle iron, ½" round iron, 2' long.

Construction:

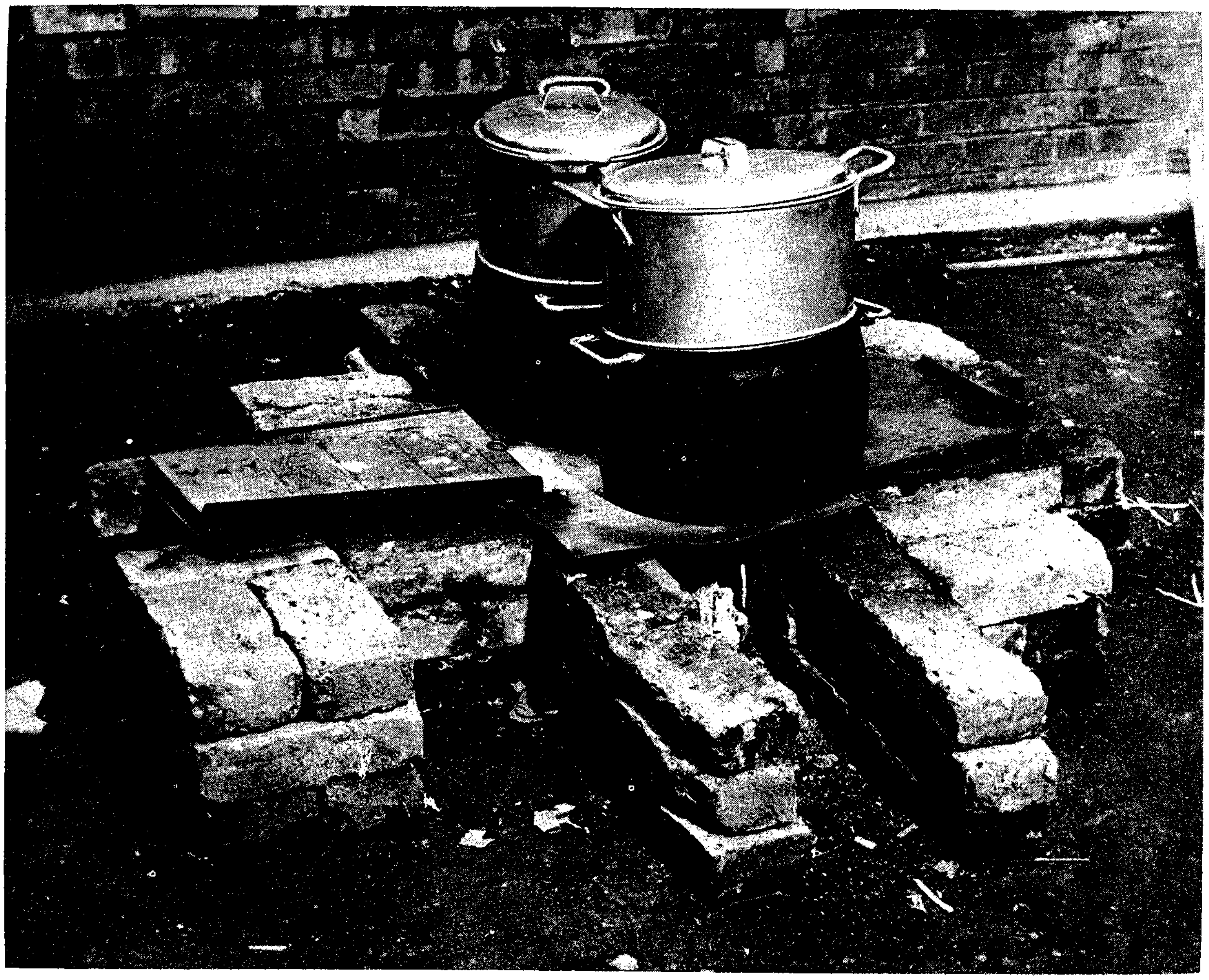
1. Dig two (2) trenches, each eight feet long, one foot wide and one foot deep, crossing at their centers.
2. The ends of each trench tapered to the level of the ground.
3. Place scrap iron over the intersection of the trenches to make a grate.
4. Use the three pieces of sheet metal to block off three of the four sides of the trenches. Leave open side facing the direction of the wind.

Utilization for Cooking:

1. Erect a metal frame two feet above the grate to hold cooking containers.
2. Drive two (2) forked upright supports into the ground on opposite sides of the grate. These supports should extend 2' above the level of the ground. Across the supports place a round spit.

Requirements:

1. Two per 100 group unit.
2. Six per 500 group unit.

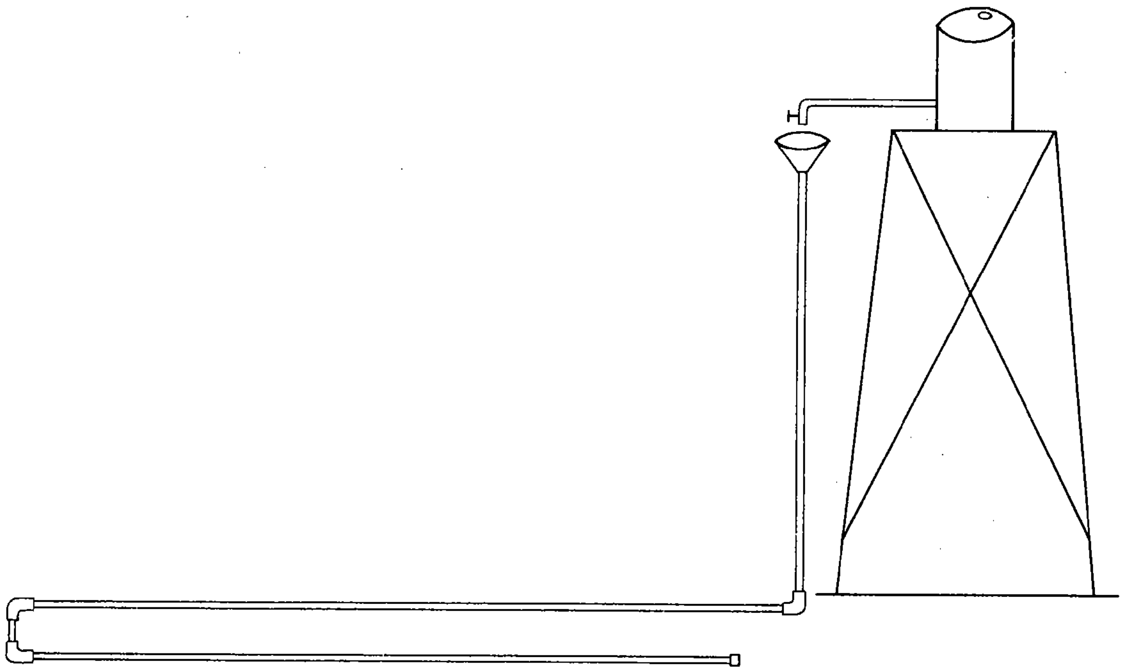


ALTERNATE CONSTRUCTION

A cross fire trench may also be built above the ground utilizing brick, stone or similar material to construct the sidewalls as illustrated in photograph "Above Ground—Cross Fire Trench".

CHART III

TROMBONE HEATER



Material Required:

1. Galvanized iron pipe:
    - A. One piece 3/4" pipe 5' long for vertical pipe.
    - B. One piece 3/4" pipe 9' long for top horizontal pipe.
    - C. One piece 3/4" pipe 8' long for bottom horizontal pipe.
2. Pipe fittings:
    - A. Three elbows 3/4".
    - B. One nipple 3/4" x 6".
    - C. One plug 3/4".
3. One metal gasoline container with drip valve or improvised drip valve.

Construction:

1. Join pipe, elbows, nipple and plug as shown in diagram.
2. Fashion funnel from a tin can and insert in top of vertical pipe.
3. Place gasoline container above funnel allowing drip valve to extend to center of funnel.

4. Drill 1/32" holes in lower horizontal pipe, located so they will be under cooking container. Use hand drill.

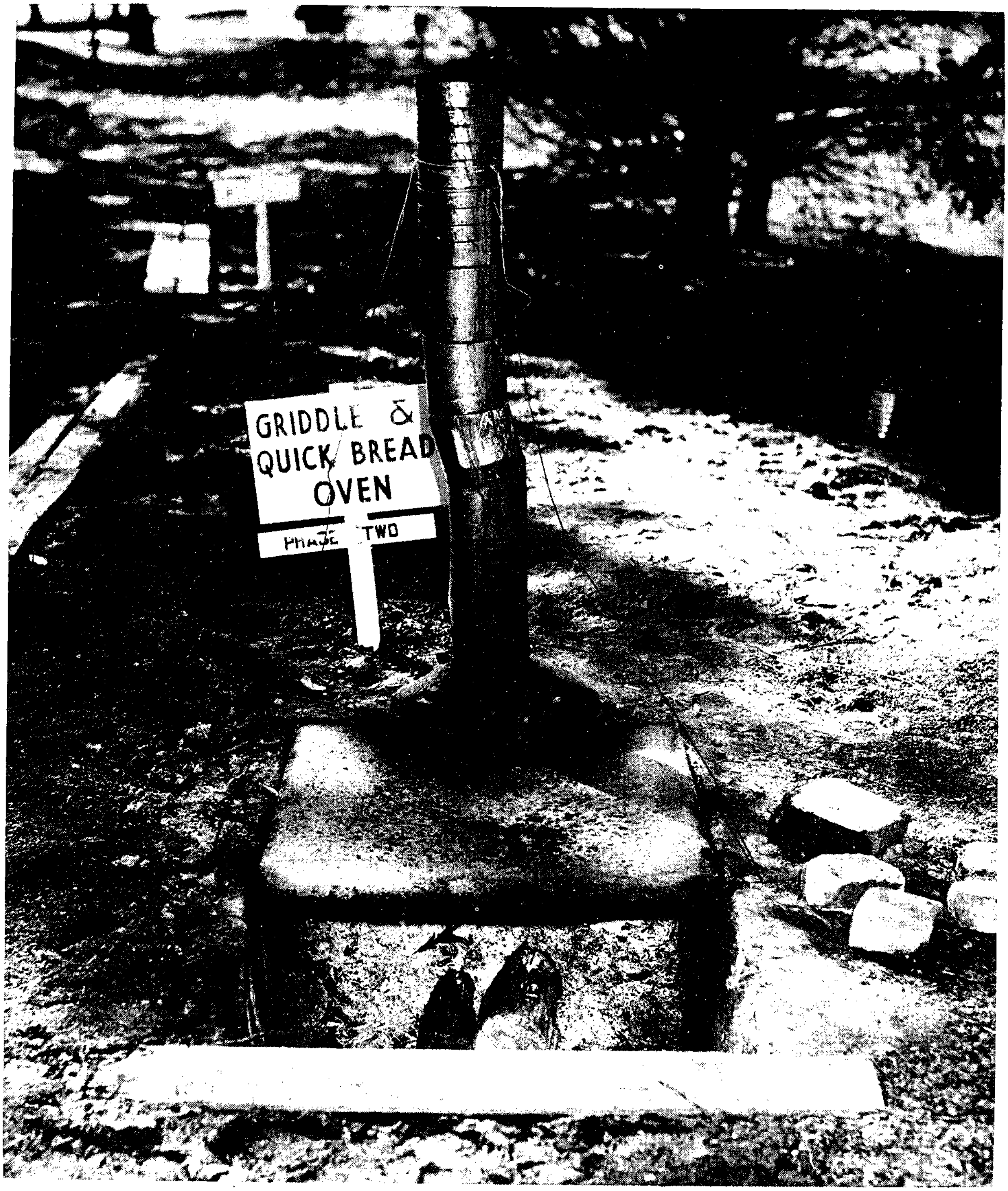
Operation:

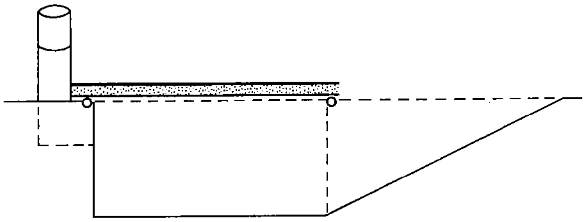
1. This heater may be used for many purposes.
2. Place horizontal pipes in a trench or built-up enclosure.
3. Open drip valve of gasoline container.
4. Allow gasoline to flow through small holes in bottom horizontal pipe and cover bottom of trench.
5. Close drip valve.
6. Ignite gasoline in trench so that it will pre-heat top horizontal pipe to the point that it will vaporize gasoline.
7. Open drip valve.
8. Gasoline will vaporize as it contacts top horizontal pipe. Vaporized gasoline will escape through small holes of bottom horizontal pipe and be ignited. Result is a flame similar to that of a blow torch.

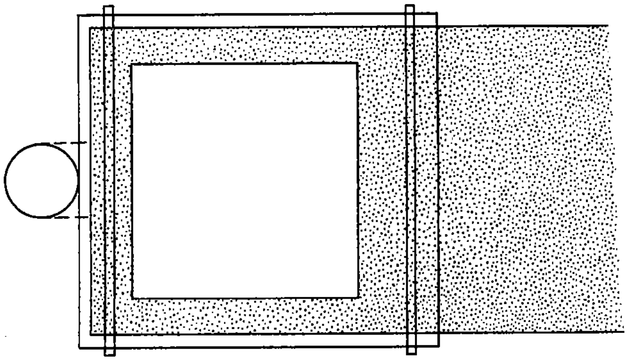
Requirements:

1. One per 100 group unit.
2. Three per 500 group unit.

CHART IV







Material Required:
1. One (1) fire pit 2 feet square and 1 foot deep. One side sloping to level of ground.
2. One (1) steel plate 2'6" x 2'6" x 1/8" to 1/4" thick.
3. One (1) steel plate 2'6" x 2'6" x 1/4" to 3/8" thick.
4. Two (2) or more #10 cans with both ends cut out of cans.
5. Two (2) pieces of pipe 1" to 2" diameter by 2'6" long.
6. Sand or dirt.

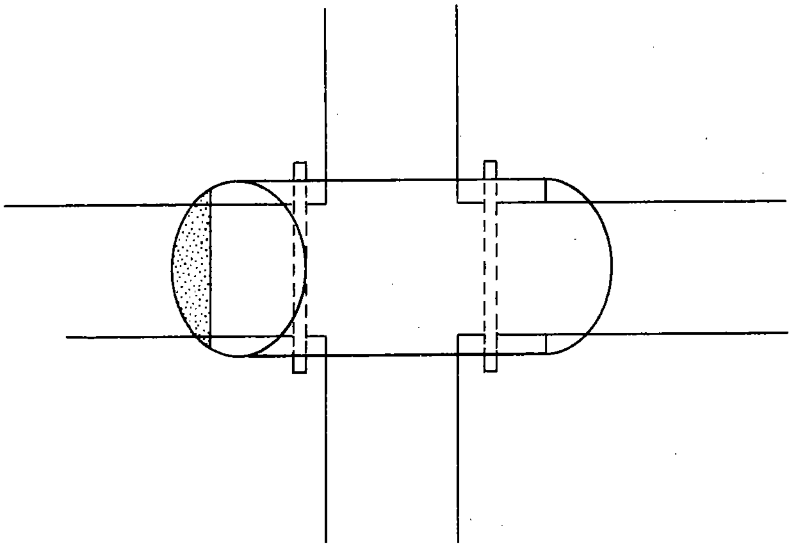
Construction:
1. Dig fire pit to deminsions given in Material Required.
2. Place lengths of pipe across two sides of fire pit.
3. Place thinner steel plate over fire pit.
4. Cover steel plate with one inch of sand or dirt.
5. Cover sand or dirt with heavier steel plate.
6. At center of one side of fire pit, dig hole 6" square and 6" deep so that hole opens into fire pit.
7. Place #10 cans one on top of the other and place over hole in ground as outlined in step 6 above.
8. One piece of steel plate 2'6" x 2'6" x 1/4" to 3/8" thick may be used instead of two pieces steel plate with sand or dirt.

Utilization:
1. This unit may be used as a griddle or quick bread oven.
2. If used as quick bread oven, place dough on flat surface and cover with a tin can.

Requirements:
1. Two per 100 group unit.
2. Six per 500 group unit.

CHART V

BARREL OVEN (over cross fire trench)



Material Required:

1. One (1) 55 gallon oil drum.
2. Two (2) pieces of pipe 1" to 2" in diameter and 2'6" long.
3. One steel plate 1/8" to 1/4" thick x 40" x 20".
4. Sand or dirt.
5. Dirt and straw or grass.
6. One (1) piece sheet metal 2' x 2'.

Construction:

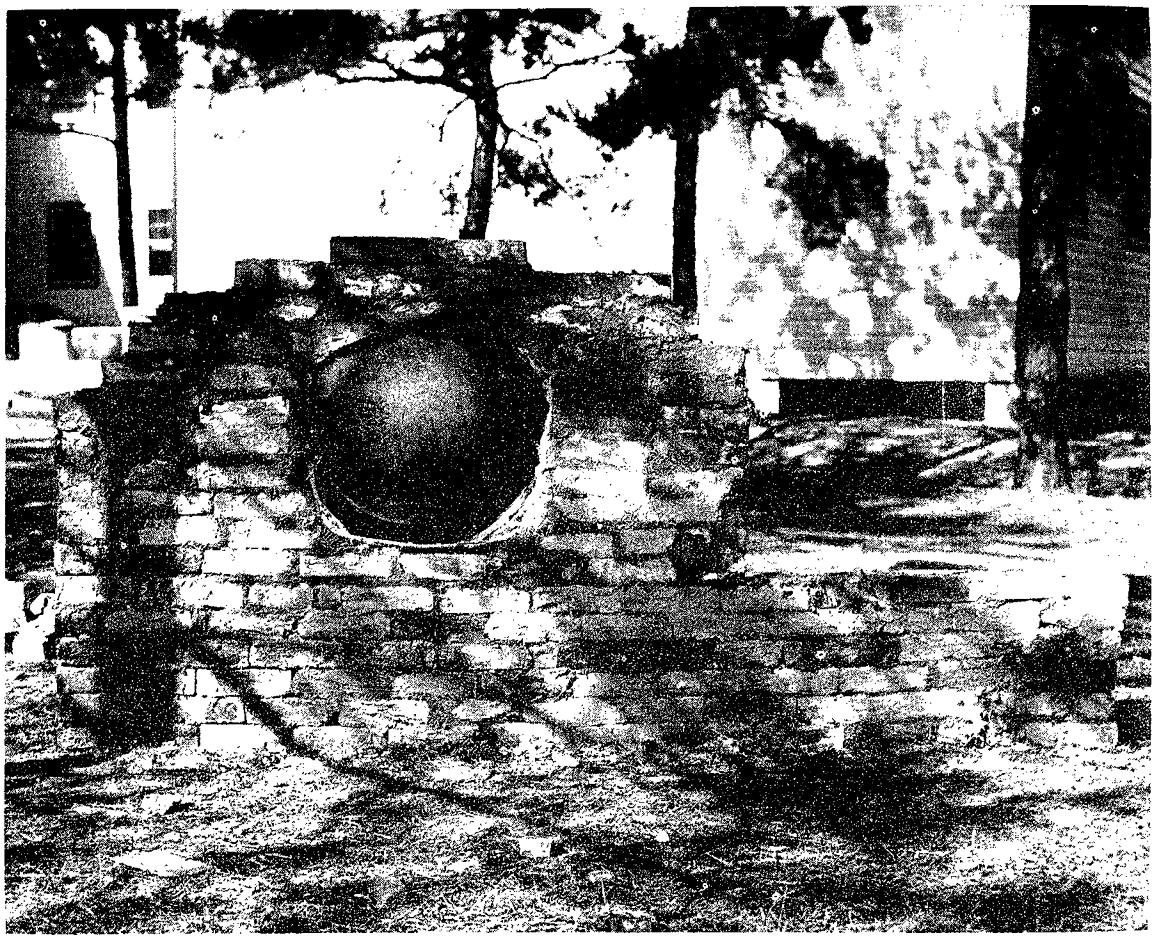
1. Construct a cross fire trench as shown in Chart II. Make trenches 1'6" wide instead of just 1' wide.
2. Place two (2) pieces of pipe across trench as shown in diagram.
3. Six (6) inches from edge of trench parallel to pipe dig small trench for pipe 4" deep.
4. Place drum on pipe (see diagram).
5. Place layer of sand or dirt in drum six inches deep at deepest point.
6. Place steel plate 1/8" to 1/4" thick x 40" x 20" in drum on top of layer of sand or dirt.
7. Dig a small hole in the ground. Mix dirt, water and grass, straw or hay to the consistency of soft dough.
8. Pack dirt, water and grass mixture four inches thick on all outside surfaces of barrel that are above the ground level.
9. Use sheet metal 2' x 2' for oven door.

Requirements:

1. Two per 100 group unit.
2. Six per 500 group unit.

CHART VI

COMBINATION HOT PLATE AND OVEN



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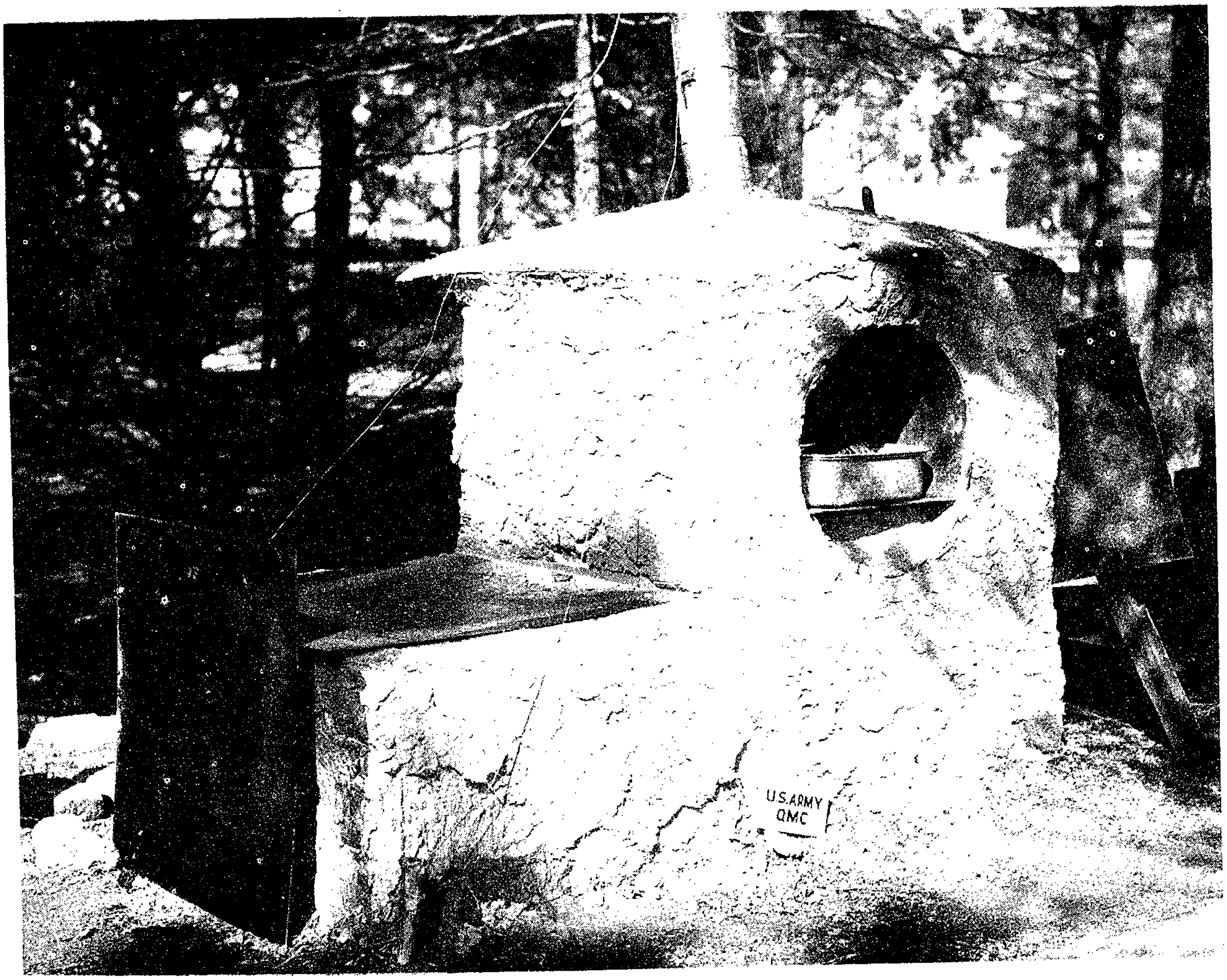

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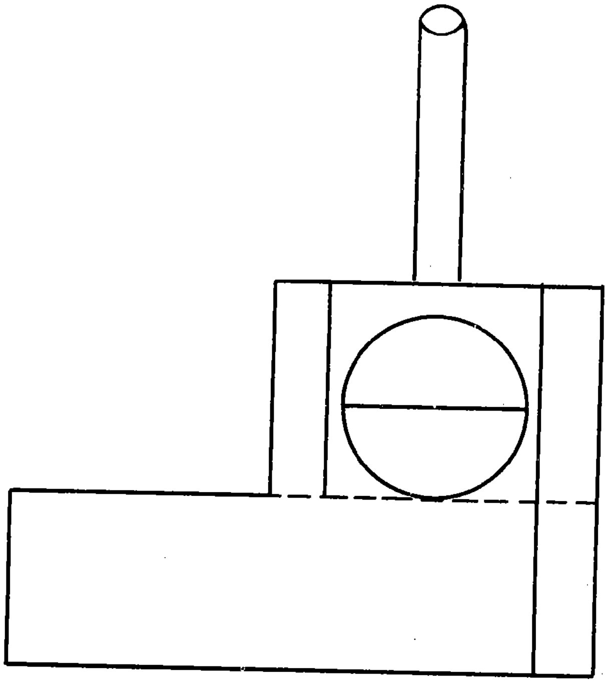


Material Required:

1. Approximately 350 bricks.
2. One 55 gallon oil drum.
3. One steel plate 42" x 24" x 3/8".
4. Three #10 cans with ends removed.
5. One steel plate 3'9" x 3'3" x 3/8" with a 6" hole in direct center.
6. One steel plate 3' x 3' x 3/8" for griddle.
7. Two pieces of iron, each 3'3" x 2" x 1/2".

Construction:

1. Outline a rectangle on flat ground 3'3" x 6'8".
2. Wet the ground. Put a thick layer of mortar, made of mud and straw or grass, 8 inches wide around inside edge of rectangle. Leave one end of rectangle open.
3. Lay brick walls 8 inches wide and 2 feet high.
4. Lay drum across side walls 11 inches in from outside edge of end wall. Open end of drum flush with outside edge of one side wall.
5. Lay griddle on side walls flush with open end of rectangle.
6. Lay two pieces of iron across side walls between griddle and drum.

7. Lay brick wall 8 inches wide and 2 feet 6 inches high on two pieces of iron.
8. Continue building side walls and back wall to a height of 4 feet 6 inches.
9. Place steel plate with 6 inch hole in center across top of walls.
10. Join #10 cans end to end and insert in 6 inch hole in steel plate.
11. Cover steel plate with a 3 inch layer of mortar.
12. Insert steel plate 42" x 24" x 3/8" inside drum.
13. Nail block of wood to the end cut out of drum. This will be used as a door for oven.

Operation:

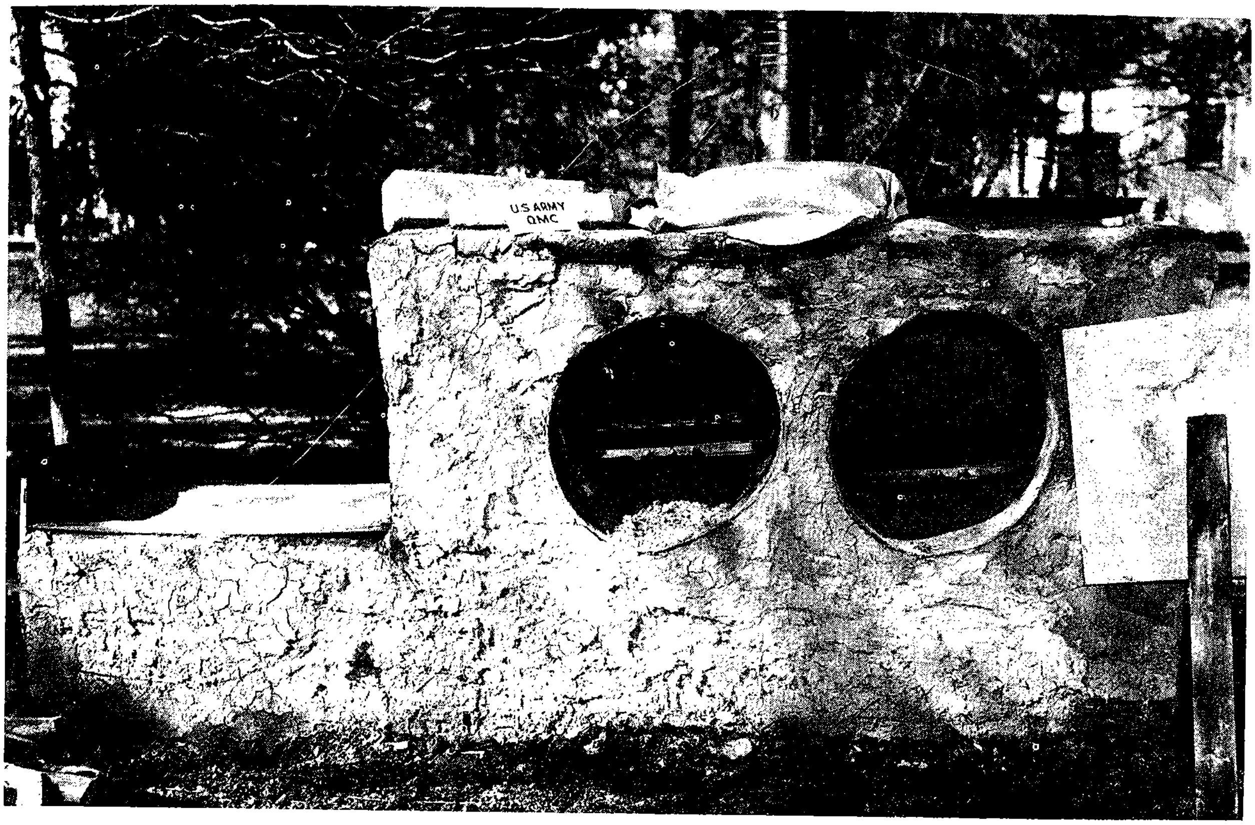
1. Start a wood or coal fire under griddle and oven. Heat output will be sufficient for griddle cooking and/or baking or both.

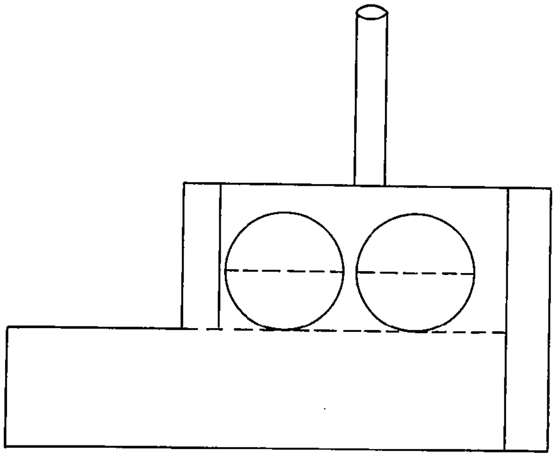
Requirements:

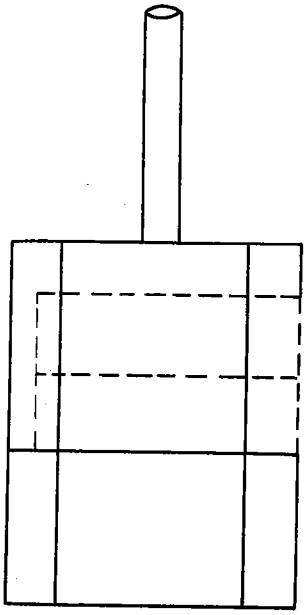
1. Two per 100 group unit.
2. Six per 500 group unit.

CHART VII

DOUBLE BARREL OVEN WITH GRIDDLE







Material Required:

1. Two 55 gallon oil drums with one end removed from each. Save ends for oven doors.
2. Two steel plates each 42" x 24" x 3/8".
3. Three #10 cans, with ends removed.
4. One piece of steel plate 6'6" x 3'3" x 1/8" to 1/4" thick, with a 6" hole centered.
5. Approximately 450 bricks.
6. One piece of steel plate 3' x 3' x 1/8", for a griddle.
7. Two pieces of iron, each 3'3" x 2" x 1/2".

Construction:

1. Outline a rectangle on flat ground 3'3" x 9'3".
2. Wet the ground, Put a thick layer of mortar (as outlined in Chart IV) 8" wide around inside edge of rectangle, leaving a 1'11" opening at fire box end.
3. Lay brick walls 8" wide and 2' high.
4. Lay one drum across side walls 1'6" in from outside edge of back wall and open end of drum flush with outside edge one side wall. Other end of drum should extend three to four inches over inside edge of opposite side wall.
5. Lay other drum 3" from first drum in the same manner.
6. Lay griddle on fire box end of trench.
7. Lay two pieces of iron across trench between griddle and barrel.
8. Lay brick wall 8" wide and 2'6" high on two pieces of iron.
9. Continue building side and back walls to a height of 4'6", use mortar to fill in between drums.
10. Place steel plate with six inch hole in center across top of walls.
11. Join #10 cans end to end and insert in six inch hole in steel plate.
12. Cover steel plate with a three inch layer of mortar.
13. Insert two steel plates each 42" x 24" x 3/8", one in each barrel.
14. Nail blocks of wood to ends cut out of drums. These will be used as oven doors.

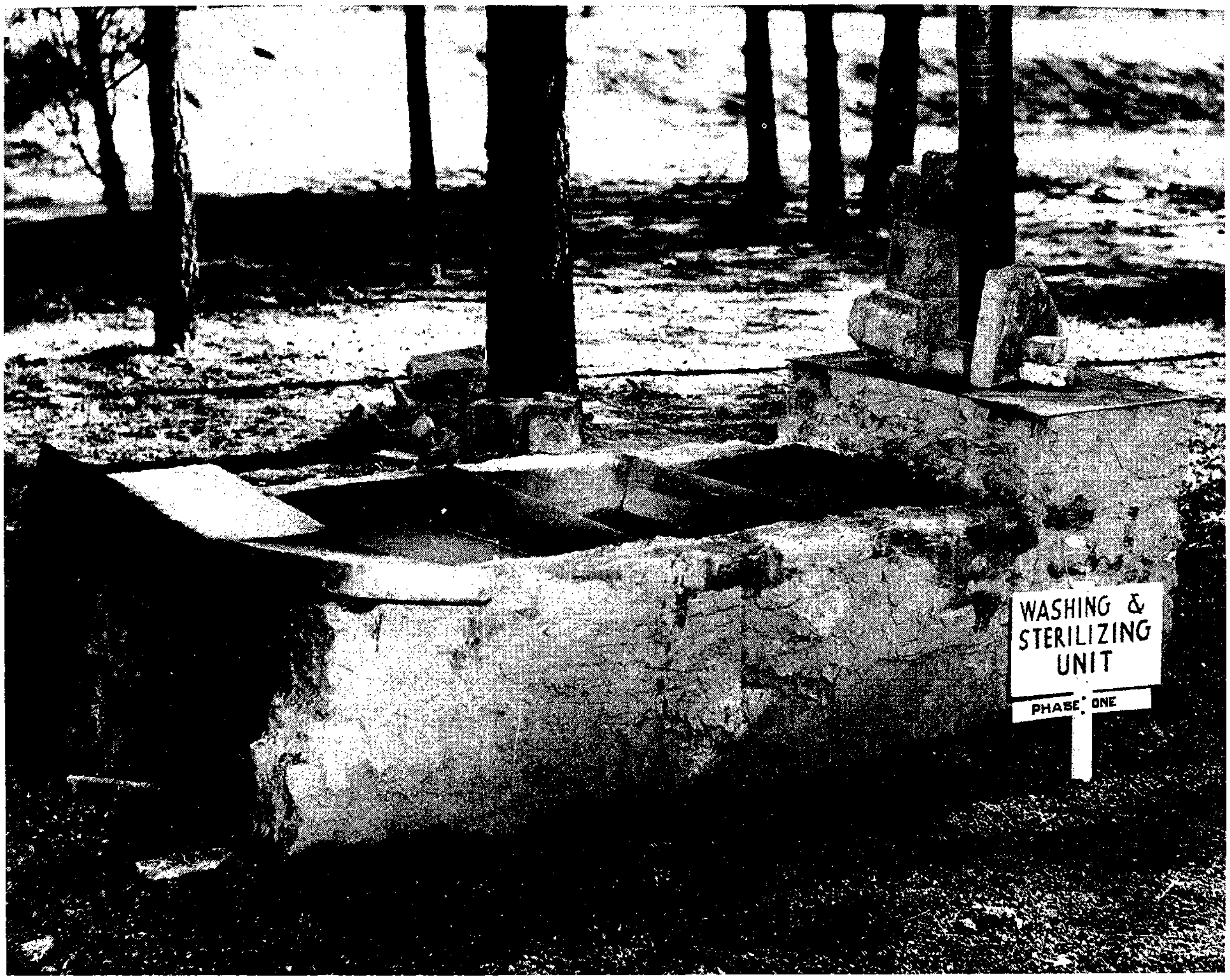
Operation:

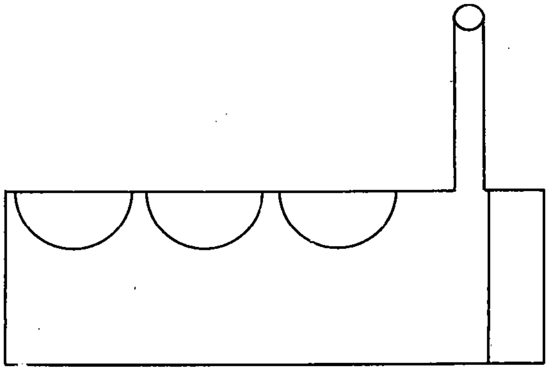
1. Start wood or coal fire under griddle and ovens. Heat output will be sufficient for griddle cooking and/or baking or both.
2. Trombone heater (Chart III) may be used for source of heat.

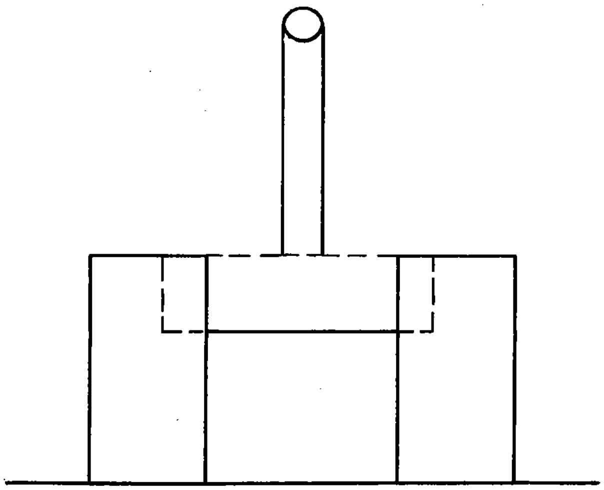
Requirements:

1. One per 100 group unit.
2. Three per 500 group unit.

CHART VIII







Material Required:

1. Approximately 350 bricks (stones, rocks, concrete chunks or blocks may be used).
2. One (1) piece steel plate 2' x 3'6" x 1/8" to 1/4" with a 6" hole in the center.
3. Three (3) 55 gallon drums cut in half length wise.
4. Four (4) #10 cans with the ends cut out.
5. One piece of sheet metal 3' x 3'.

Construction:

1. Outline a rectangle on flat ground 4'11" x 9'3".
2. Wet the ground. Put a thick layer of mortar 1'6" wide around inside edge of rectangle, leaving a 1'11" space at fire box end.
3. Wet the brick and lay the first row of bricks 1'6" wide for walls.
4. Continue laying bricks until walls are two (2) feet high.
5. Lay halved drums across walls as shown in diagram. Drum at fire box end should be inset three inches. Drums should be three inches apart. Ends of drums should extend six inches over inside edges of walls.
6. Continue laying bricks to height of three feet. Place mortar between drums.
7. Lay sheet metal with six inch hole across closed end with one long edge extending 9 1/2 inches over inside of end wall.
8. Fit #10 cans end to end and insert one (1) end of stack into hole in plate mentioned in par. 7, above.
9. Cover steel plate with two inches of mortar.
10. Use sheet motal 3' x 3' as a fire box door.

Operation:

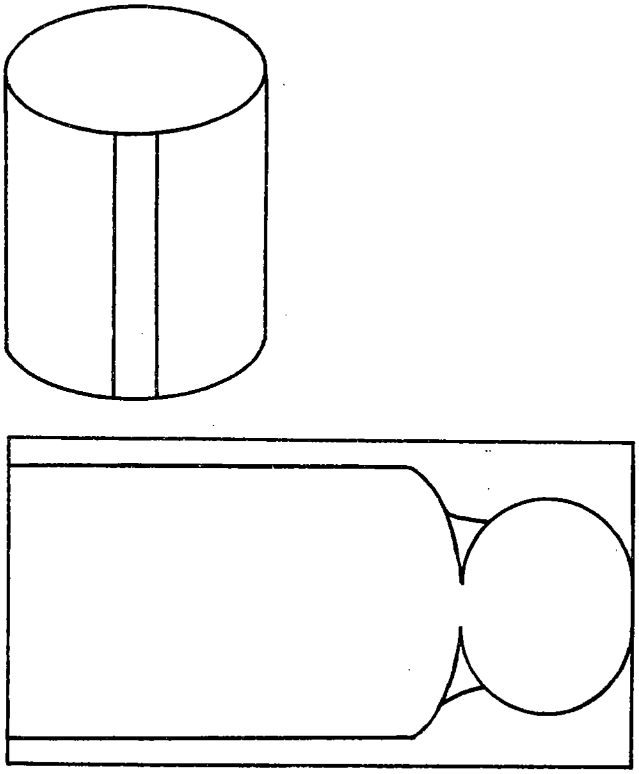
1. Start a wood or coal fire the full length of unit, under half drums.
2. Use one half drum as soapy water container. Use other two (2) half drums as rinses.
3. Trombone heater (Chart III) may be used for heat.

Requirements:

1. One per 100 group unit.
2. Three per 500 group unit.

CHART IX

SERVING SPOON



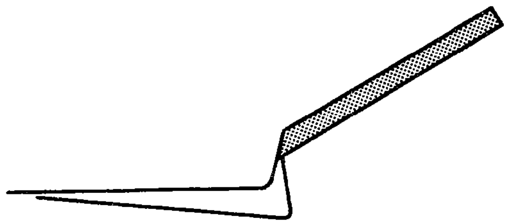
Material Required:
1. One (1) #10 can.

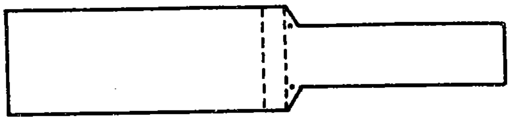
Construction:
1. Cut both ends from #10 can.
2. Cut seam out of can.
3. Flatten remaining metal.
4. Outline spoon on metal as shown in diagram.
5. Cut along outline.
6. Fold edges of handle under so that handle is 1½" wide.
7. Counter sink spoon end with a hammer.
8. Trench the handle and neck of spoon from top side.

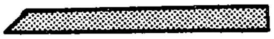
Requirements:
1. Four per 100 group unit.
2. Six per 500 group unit.

CHART X

SERVING SPATULA







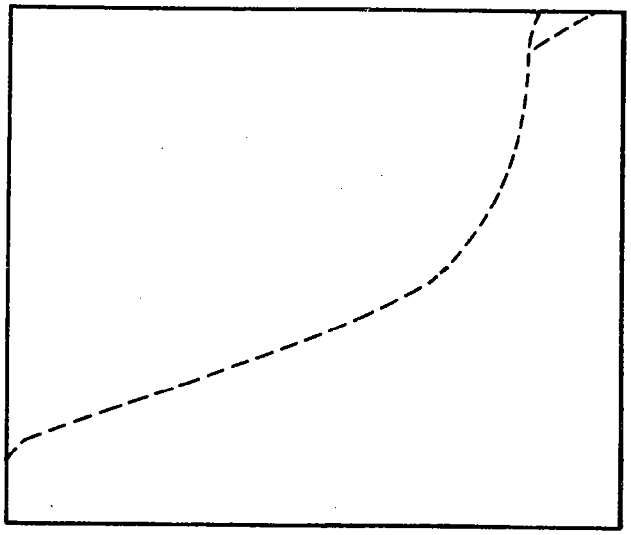
Material Required:
1. Two strips of metal from a #10 can, 11½" x 2½".
2. One piece of wood 1½" x 4½" x ½".
3. Five shingle nails.

Construction:
1. Cut strips of metal as shown in diagram. Spatula blade 6½" long, handle 5" long.
2. Cut one end of wood to a 45° angle as shown in diagram.
3. Nail handles of metal strips, one on each side of piece of wood.
4. Bend top metal strip flush to angle cut of wood and nail metal strip to wood.
5. Bend spatula blade of top metal strip 1½' from bend in par. 4 above, as shown in diagram.
6. Shape bottom metal strip as shown in diagram. This strip supports spatula blade.

Requirements:
1. Four per 100 group unit.
2. Six per 500 group unit.

CHART XI

SCOOP



Material Required:

1. One #10 can.

Construction:

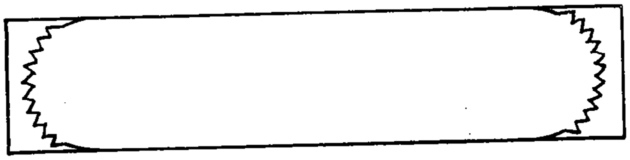
1. Outline shape of scoop on can as shown in diagram. One inch up from open end of can. One inch from bottom of can toward open end of can. Slope scoop as shown by dotted line.
2. Cut out scoop along dotted line.
3. Bend narrow part of metal, nearest bottom end of can down to prevent metal from cutting hand when using.

Requirements:

1. Two per 100 group unit.
2. Three per 500 group unit.

CHART XII

SERVING TONGS



Material Required:

1. Strip of metal from a tin can 1¼" x 14".
2. One piece of round wood ½" diameter, 1" long.

Construction:

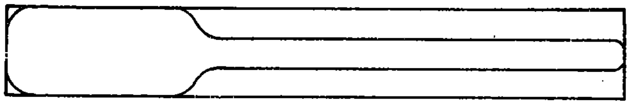
1. Round each end of strip of metal.
2. Cut teeth into round ends.
3. Bend strip of metal at center to form a "V" shape. Nail piece of wood in apex of "V".
4. Countersink metal strip from ends to apex of "V". This should be done from inner side of "V".

Requirements:

1. Four per 100 group unit.
2. Six per 500 group unit.

CHART XIII

WOODEN SPATULA



Material Required:
1. One piece of wood 1" x 6" x 3'6".

Construction:
1. Outline spatula as shown in diagram. Paddle should be one foot long. Handle should be 2" wide and 2'6" long.
2. Round corners of paddle and handle.
3. Spatula is used in preparing soups, stews, etc.

Requirements:
1. Three per 100 group unit.
2. Four per 500 group unit.

CHART XIV

DIPPERS OR LADLES

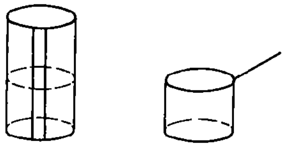


FIGURE 1 (3/4 cup)

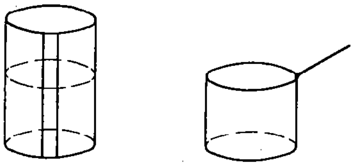


FIGURE 2 (1 1/2 cups)

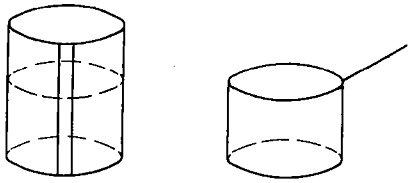


FIGURE 3 (2 cups)

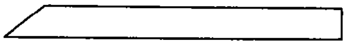


FIGURE 4

Material Required:

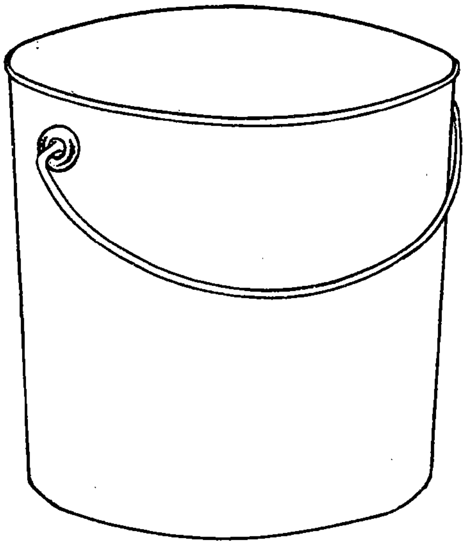
1. One #1 can (large condensed or evaporated milk can).
2. One #2 can (vegetable or soup can).
3. One #2½ can (fruit can)
4. Three pieces of broom handle each 12" long.

Construction:

- A. Dipper, 3/4 cup
  1. Cut down each side of seam of #1 can. Seam should be one inch wide. Cut to within 1 5/8" of bottom of can.
  2. Cut from seam of can around to other side of seam.
  3. Bend top part of seam back to a 45° angle. (See diagram Figure 1)
  4. Cut one end of one piece of broom handle to a 45°angle.
  5. Nail seam of can to broom handle.
- B. Dipper, 1 1/2 cup
  1. Cut down each side of seam of #2 can. Seam should be 1" wide. Cut to within 2 1/2" of bottom of can.
  2. Follow same procedure as "A" above.
- C. Dipper, 2 cup
  1. Cut down each side of seam of # 2 1/2 can. Seam should be one inch wide. Cut to within 2 3/4" of bottom of can.
  2. Follow same procedure as "A" above.

CHART XV

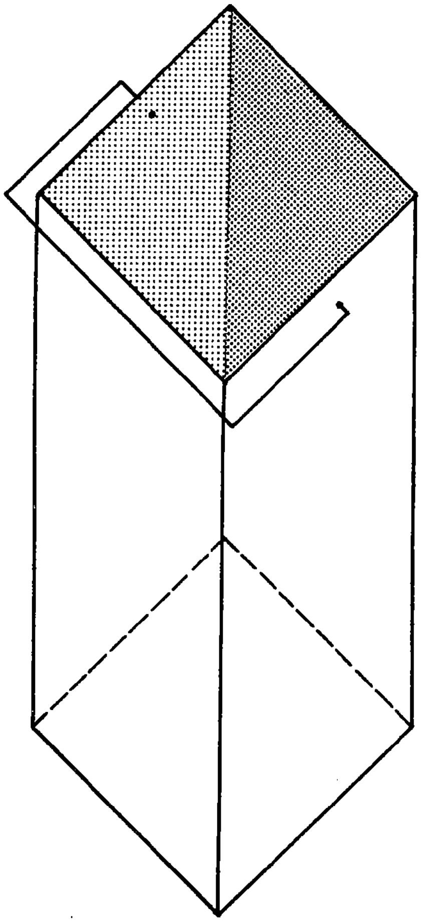
COOKING VESSELS



Material Required:
1. One 14 quart bucket or bucket of similar size.

Scale: 1/4" = 1"

Requirements:
1. Four per 100 group unit.



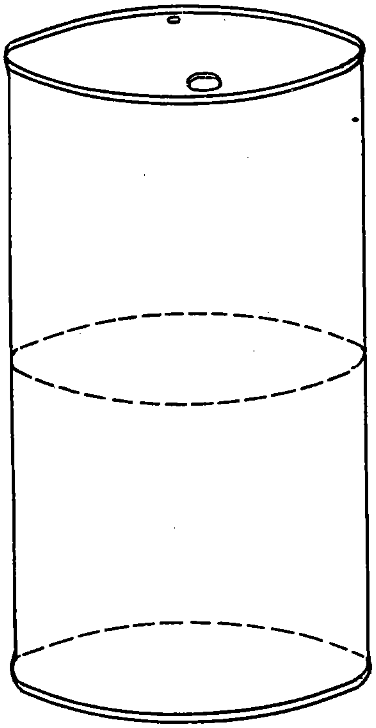
Material Required:
1. One 37 lb lard can, or can of similar size, with one end of can removed.
2. Baling wire.

Construction:
1. Punch holes in opposite sides of can 1" down from open end.
2. Insert baling wire in holes of can to serve as a handle.

Scale: 1" = 6"
Requirements: Two per 100 Group Unit.

CHART XVI

COOKING VESSELS



Material Required:

1. One 55 gallon oil drum.

Construction:

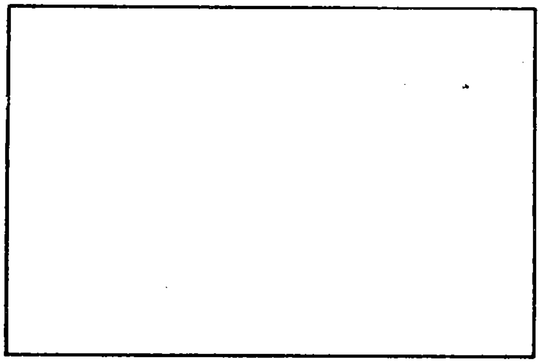
1. Cut drum in two (2) pieces (see diagram).
2. Use both pieces to cook in, if end with bungs does not leak.
3. Drum must be thoroughly cleaned, scoured, and sterilized before used.

Requirements:

1. Two half sections per 100 group unit.

CHART XVII

SERVING SURFACE



Material Required:

1. Smooth piece of wood 2' x 3', or smooth piece of sheet metal 2' x 3'.
2. Place smooth surface on wooden or metal stand. Stand should be 3' high.

Utilization:

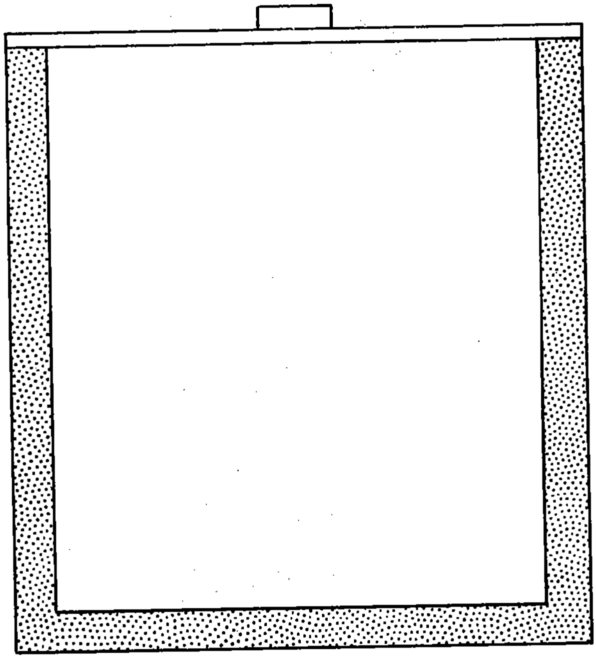
1. May be used as a work table or to serve from.
2. Dimensions as shown may be varied according to needs.

Requirements:

1. Four per 100 group unit.

CHART XVIII

HOT FOOD CONTAINER



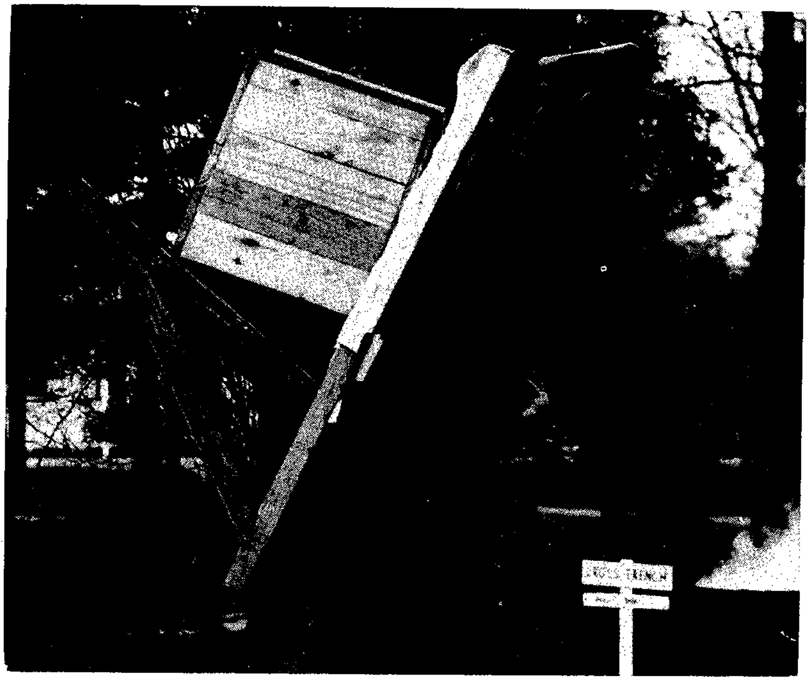
Material Required:
1. One (1) large can, such as a 37 lb lard can.
2. Construct a box from plywood or similar material 1" wider and 1" deeper than the can.
3. Sand.
4. Boards 1" x 6" X various lengths

Construction:
1. Heat the sand.
2. Place one inch of hot sand in the bottom of box.
3. Place 37 lb can inside box.
4. Fill space between sides of can and box with hot sand.
5. Place hot food inside of can.
6. Construct a lid from boards.

Utilization:
1. This container can be used to transport hot food to persons unable to come to the messing area.
2. If carried long distances, cover entire container with heavy canvass to retain heat.

Requirements:
1. Three per 100 group unit mobile, solids.
2. Two per 100 group unit mobile, beverages.

CHART XIX
“A” FRAME TRANSPORT



“A” Frame Transport—with Hot Food Container

Material Required:

1. Nails
2. Rope 6' long.
3. Lumber 2" x 2" x 30'.
4. Heavy mat 3' x 3'.

Construction:

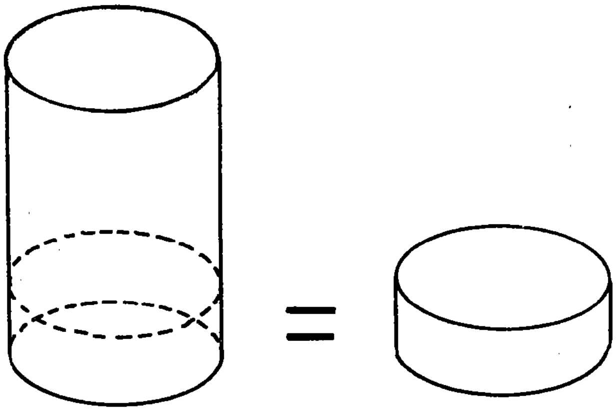
1. Two uprights should each be four feet long.
2. Upper ends of uprights one foot between.
3. Lower ends of supports three feet a part.
4. Two pieces extending at right angles to uprights should each be two feet long and three feet from top end of uprights and braced as shown in diagram.
5. Two pieces of rope each three feet long attached as shown for shoulder straps.
6. Heavy mat should be attached to frame to act as cushion.

Requirements:

1. Three per 100 group unit mobile, solids.
2. Two per 100 group unit mobile, beverages.

CHART XX

#10 CAN PLATE OR BOWL



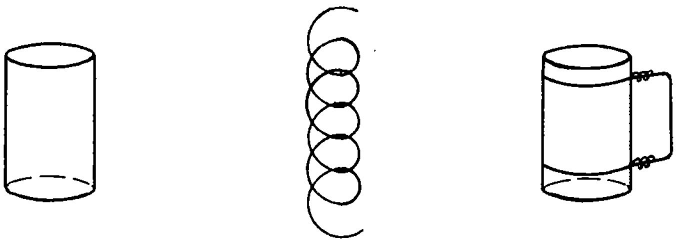
Material Required:
1. One #10 can.

Construction:
1. Cut #10 can two (2) inches from the bottom.
2. Roll edges out and down to prevent the individual from injuring himself on the otherwise sharp edges.

Requirements:
1. One per individual.

CHART XXI

CUP



Material Required:

1. One (1) #2½ can.
2. Baling wire.

Construction:

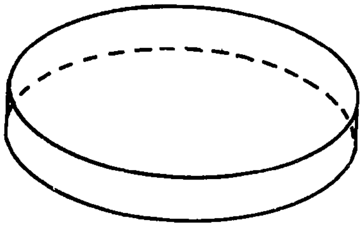
1. Wrap one (1) end of wire around top of can.
2. Wrap other end of wire around bottom end of can.
3. Leave enough wire between the top and bottom of the can to serve as a handle.

Requirements:

1. One per individual.

CHART XXII

FRUIT OR DESSERT DISH



Material Required:

1. One (1) sardine can or can of similar size.

Construction:

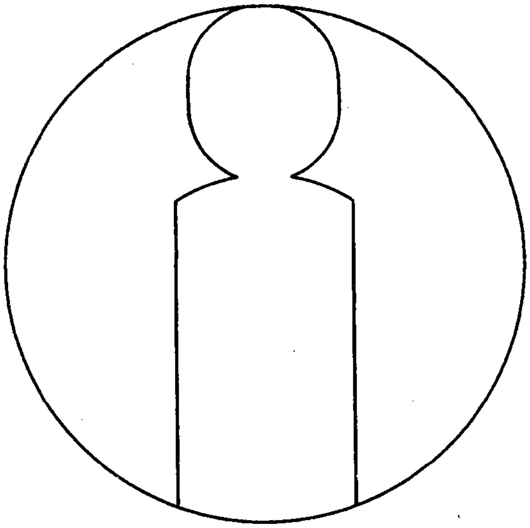
1. Remove lid from can.
2. Roll down edges of can.

Requirements:

1. One per individual.

CHART XXIII

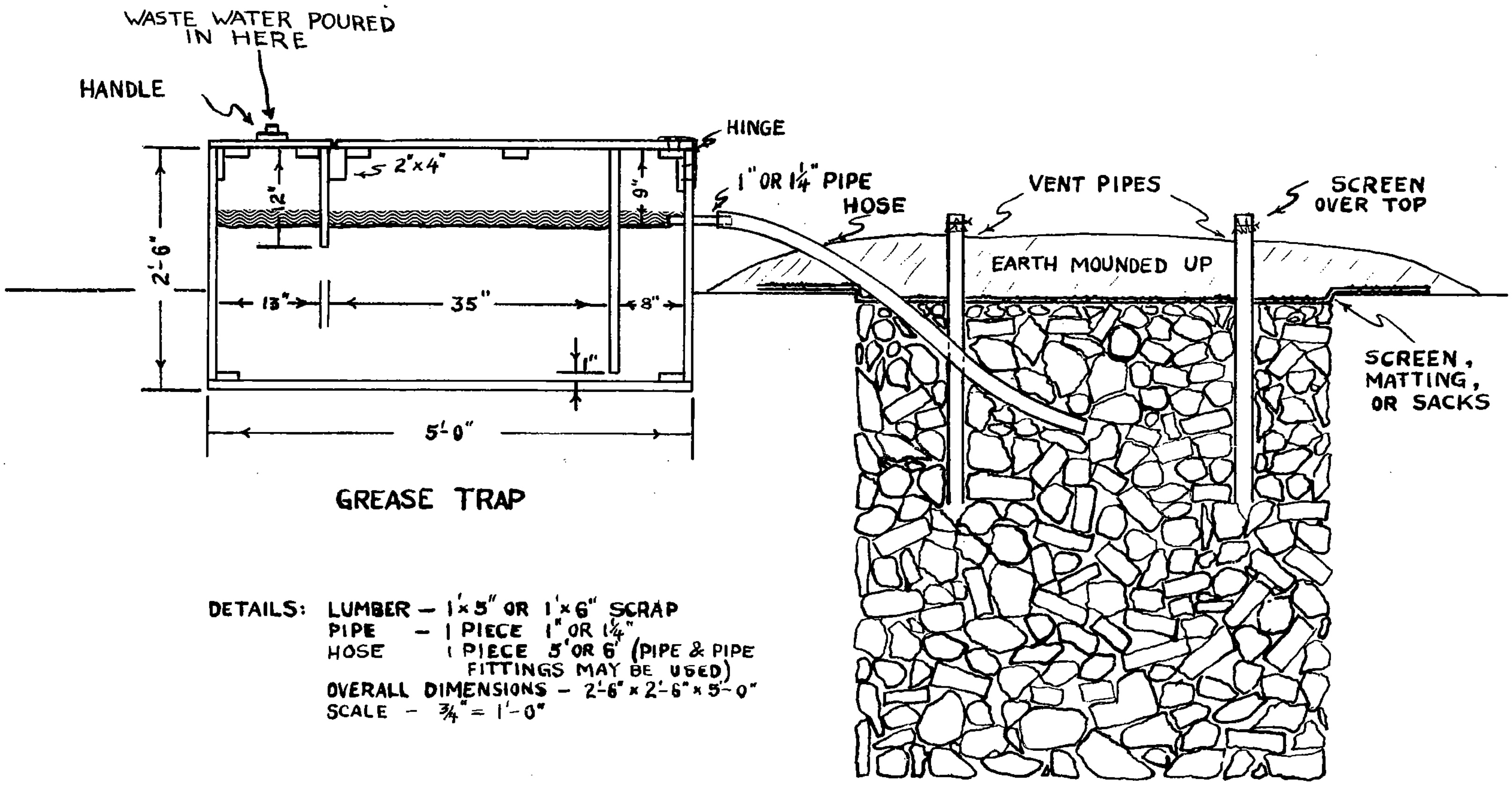
EATING SPOON



Material Required:
1. One (1) lid from a #10 can.

Construction:
1. Outline spoon on lid as shown in diagram.
2. Cut along outline.
3. Fold edges of handle under so that handle is one inch wide.
4. Counter sink spoon end with a hammer.
5. Trench the handle and neck of spoon from top side.

Requirements:
1. One per individual.



GREASE TRAP

DETAILS:
LUMBER — 1'x5" OR 1'x6" SCRAP
PIPE — 1 PIECE 1" OR 1¼"
HOSE 1 PIECE 5' OR 6' (PIPE & PIPE FITTINGS MAY BE USED)
OVERALL DIMENSIONS — 2'-6" x 2'-6" x 5'-0"
SCALE — ¾" = 1'-0"

SOAKAGE PIT

CHART XXIV

GREASE TRAP

Material Required:

1. 15 pieces of lumber, 1" X 6" X 3'
2. 26 " " " , 1" X 6" X 2' 6"
3. 5 " " " , 1" X 6" X 20"
4. 5 " " " , 1" X 6" X 15"
5. 1 " " " , 2" X 4" X 2' 6"
6. 1 piece 1¼" hose, 5' long.
7. 1 piece 1¼" pipe, 6" long.

Construction:

1. By using material above, construct as shown in diagram.

SOAKAGE PIT

Material Required:

1. Well-drained ground suitable for good soakage. The best type of soil for good soakage is that with a sandy or gravelly texture.
2. Large rocks, bricks or pieces of concrete.
3. Wire screen 8 feet square and burlap to cover area 8 feet square.
4. Two pieces 2" pipe, each 5 feet long.

Construction:

1. Dig a pit 8 feet square and 8 feet in depth.
2. Fill pit with rocks, bricks or pieces of concrete.
3. Insert two pieces of pipe in the pit so that each extends 10 to 12 inches above the ground level.
4. Cover pit with screen wire and cover with burlap sacks.
5. Mound dirt over pit to an eight inch height.
6. Place pieces of screen wire over the pipes extending above the pit.
7. Insert hose from grease trap into pit.

CHART XXV

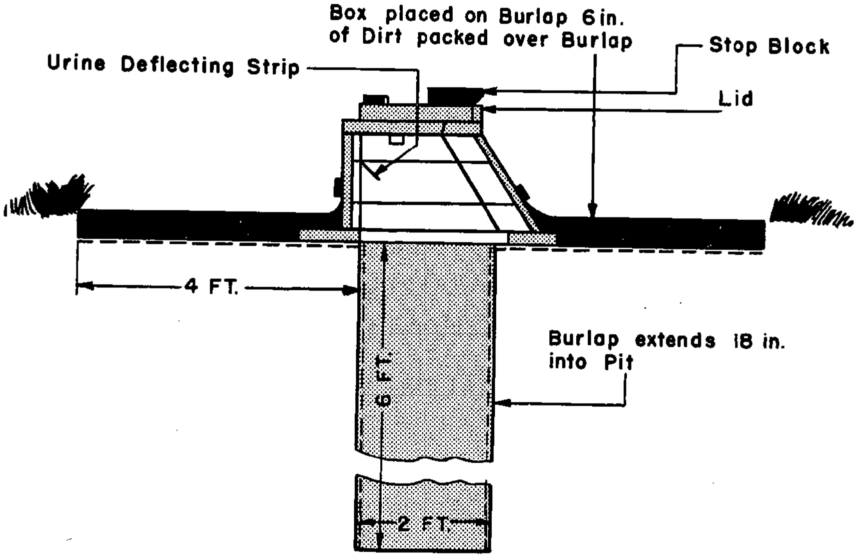
DEEP PIT LATRINE

Material Required:

1. Well-drained ground suitable for good soakage.
2. Lumber should be 2" X 4", 1" X 6" or 1" X 12" enough to construct a box with four or five seats.
3. Sheet metal 12 inches wide and as long as the inside dimensions of the box. This will be used as deflecting strip.
4. Burlaps five feet six inches and 11 feet longer than the box.
5. Heavy canvas for hinges for seat lids.

Construction:

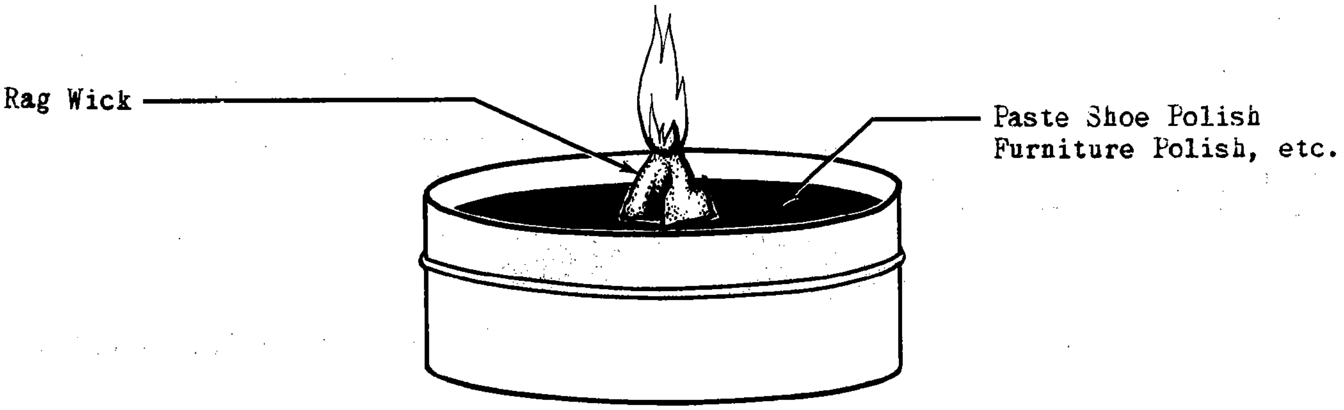
1. Dig a pit two feet wide and six to eight feet deep. The pit should be long enough to accommodate your toilet box. The size of the toilet box and number of seats depends on the number of people to be accommodated. Include one latrine for each sex.
2. Dig a six inch depression to extend out from all sides of the trench a distance of four feet.
3. Place oil soaked burlap over the depression and allow burlap to hang down into the pit 18 inches.
4. Cover burlap with earth and tramp it down, then add more oil.
5. Fit toilet box over trench.
6. Pack dirt tightly around edges of toilet box to seal it and make it fly-proof.
7. Dig a six inch drainage ditch all around the toilet box for surface drainage.


Box placed on Burlap 6in. of Dirt packed over Burlap
Stop Block
Urine Deflecting Strip
Lid
4 FT.
6 FT.
Burlap extends 18 in. into Pit
2 FT.

Schematic Diagram of Deep Pit Latrine

CHART XXVI

CANNED WAX TORCH



Material Required:

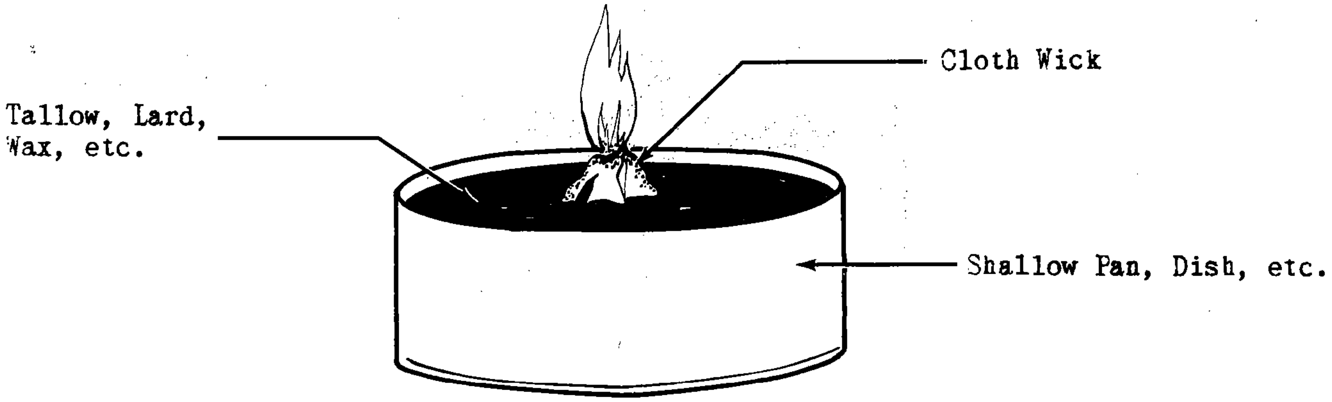
1. Paste, shoe polish, furniture polish, etc.
2. Rag for wick.

Construction:

1. Open can of wax polish.
2. Insert small rag wick.
3. Light wick.

CHART XXVII

SHALLOW PAN TORCH



Material Required:

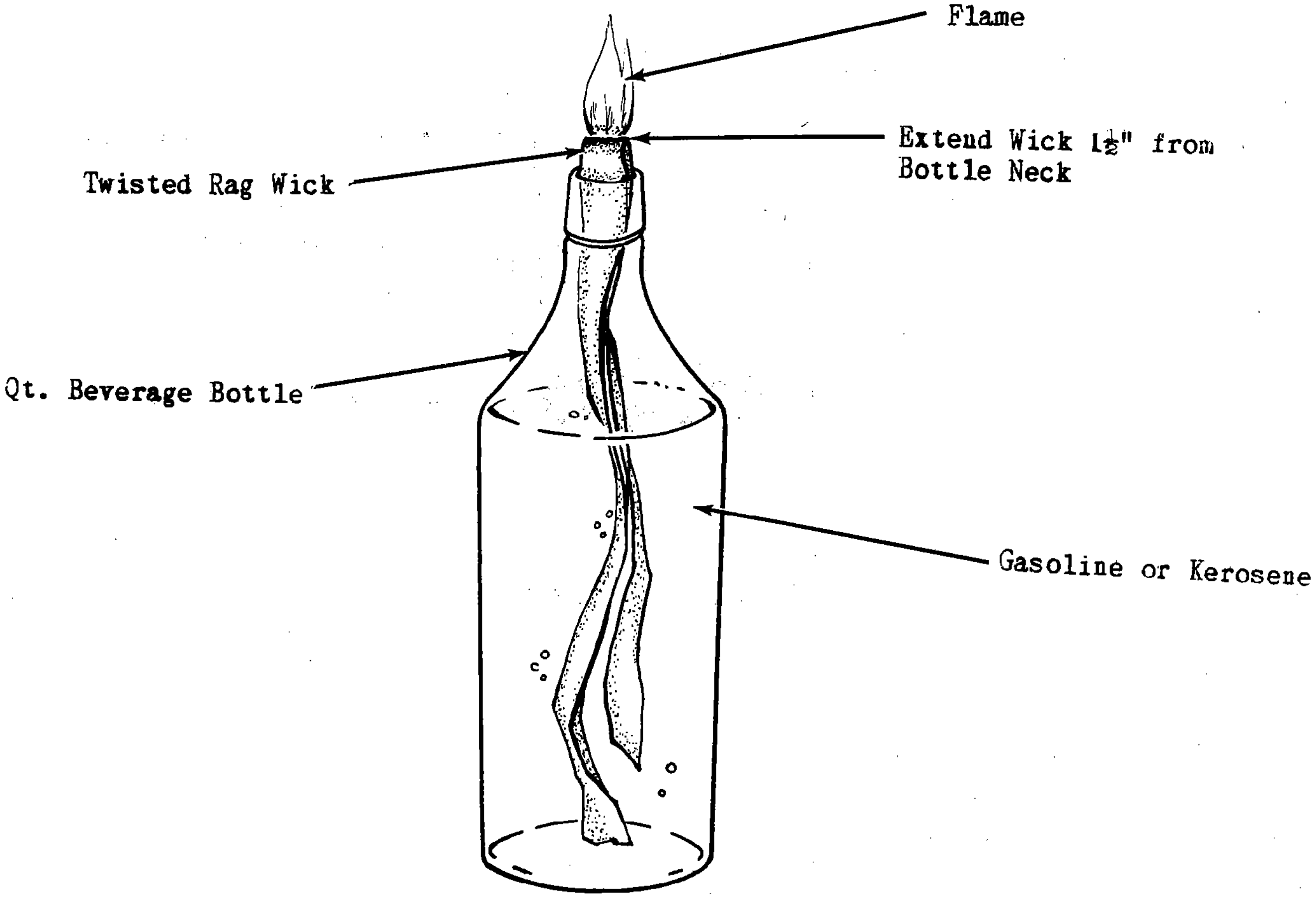
1. Rag wick.
2. Shallow pan, dish, or No. 10 can cut to 2".
3. Lard, Tallow, Wax, etc., for fuel.

Construction:

1. Fill dish or cut can with fuel.
2. Insert rag wick in fuel.
3. Light wick.

CHART XXVIII

BOTTLE TORCH



Material Required:

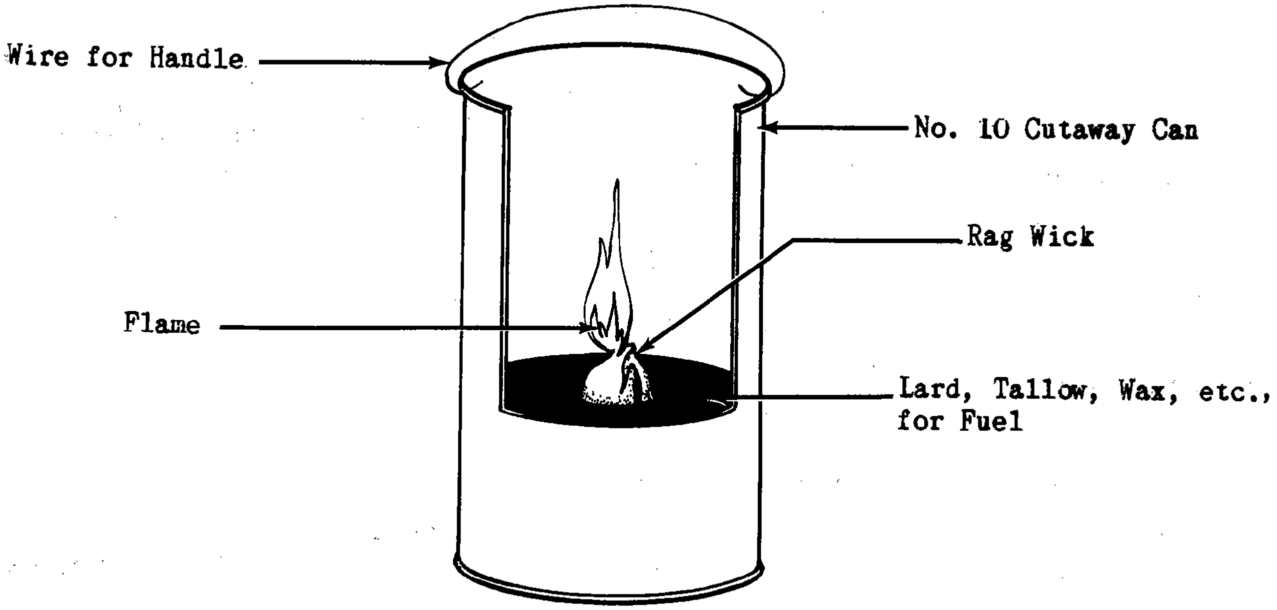
1. 1 qt. bottle.
2. Absorbent rag for wick.
3. Kerosene or gasoline.

Construction:

1. Twist rag to fit neck of bottle tightly, to form wick.
2. Fill bottle 3/4 full with fuel.
3. Insert wick in bottle neck to bottom of bottle.
4. Allow wick to extend 1½" from bottle neck.
5. Light wick.

CHART XXIX

REFLECTOR LAMP



Material Required:

1. No. 10 can.
2. Wire for handle.
3. Rag for wick.
4. Lard, tallow, wax, etc., for fuel.

Construction:

1. Cut No. 10 can as sketched, leaving 3" reservoir at bottom for fuel.
2. Fill reservoir with fuel.
3. Insert wick and light.
4. Uncut portion of can will act as reflector and windshield.

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